

## Foreword

The Department of General Services Environmentally Preferable Purchasing Program (EPP) published the Best Practices Manual in 2005 through a joint effort with various California State Agencies. DGS would like to thank and recognize these agencies for their time and commitment to this effort. The Best Practices Manual is a document that assists buyers in the procurement of products and services with a lesser impact on the environment and human health when compared to other products that serve the same purpose (Public Contract Code, Section 12400-12404). In 2010, the manual transformed into the DGS Buying Green website allowing buyers to gain insight into the key environmental impacts of a commodity, access procurement specifications and directly link to “green” contracts and commodities. The Best Practices Manual is archived where it remains as a reference resource.

### Participating Agencies

Air Resources Board	Department of Forestry	Department of Transportation	Department of Resource Recycling and Recovery (CalRecycle)
Conservation Corps	Department of Health Care Services	Department of Water Resources	Office of Environmental Health Hazard Assessment
Department of General Services	Department of Pesticide Regulation	Energy Commission	Office of State Publishing
Department of Fish and Game	Department of Toxic Substances Control	Environmental Protection Agency	Prison Industry Authority

# Environmentally Preferable Purchasing Best Practices Manual

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## INTRODUCTION

### Challenges Facing Californians ENVIRONMENTAL SUSTAINABILITY

Being environmentally sustainable is to meet “current human needs without undermining the capacity of the environment to provide for those needs over the long term.”<sup>1</sup> To achieve environmental sustainability, we must shop more responsibly. “The state, through environmentally preferable purchasing, has the ability to protect human health and environmental well-being by promoting goods and services that result in reduced waste and pollutants.”<sup>2</sup>

Each year, our State’s population increases by about 600,000.<sup>3</sup> This creates more demand for [energy](#), [water](#), and [materials](#), puts more strain on our transportation infrastructure and land resources, as well as increases pollution, [air emissions](#), and [waste](#). To help ensure a better future, we must use our resources more effectively. It’s a question of being smarter about how we use our resources, rather than doing without.

That is why Environmentally Preferable Purchasing (EPP) is important to each and every citizen of California. This guide will help you select products that offer best value, not only in terms of cost and performance, but for the health of fellow employees and our environment ...and our families. Everyone makes a difference.

Buy Green. Make a difference.  
**Buy Green. Make a difference.**

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<sup>1</sup> United Nations Millennium Project, Task Force on Environmental Sustainability. *Environment and Human Well-being: A Practical Strategy. Summary Version*, 2005, pp. 1-2. Available at [http://www.unmillenniumproject.org/documents/EnvironSust\\_summary.pdf](http://www.unmillenniumproject.org/documents/EnvironSust_summary.pdf).)

<sup>2</sup> State of California. Assembly Bill 498, Chan, Chapter 575, Statutes of 2002. Available at [http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab\\_0451-0500/ab\\_498\\_bill\\_20020916\\_chaptered.html](http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab_0451-0500/ab_498_bill_20020916_chaptered.html).)

<sup>3</sup> State of California. Department of Finance. Population of California and the United States, 1940 – 2003. California Statistical Abstract, 2004. See: [http://www.dof.ca.gov/HTML/FS\\_DATA/STAT-ABS/tables/b1.xls](http://www.dof.ca.gov/HTML/FS_DATA/STAT-ABS/tables/b1.xls).

## What is Environmentally Preferable Purchasing?

Environmentally Preferable Purchasing (EPP) refers to the procurement of goods and services that have a reduced effect on human health and the environment as compared to competing goods and services serving the same purpose.

California Statute says:

*Environmentally preferable purchasing* means the procurement or acquisition of goods and services that have a lesser or reduced effect on human health and the environment when compared with competing goods or services that serve the same purpose. This comparison shall take into consideration, to the extent feasible, raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, disposal, energy efficiency, product performance, durability, safety, the needs of the purchaser, and cost.<sup>4</sup>

This definition is similar to what is used by the federal government<sup>5</sup> and other states and local governments in part of a growing EPP movement.

California statute also provides clarity on potential concerns about EPP. It states explicitly that EPP cannot supersede recycled-content laws, require purchase of poorly performing goods, exclude adequate competition, or require unreasonable prices or lead times.<sup>6</sup>

## Finding “Best Value” through Environmentally Preferable Purchasing

**EPP = Environment + Price + Performance**

**EPP is good for our environment.** Identifying an environmentally preferable product requires a broad review of impacts that occur during the lifecycle of a product, from its production, use, to its reuse, recycling, or disposal. This analysis provides the information needed to understand impacts. Obviously, the analysis is not simple, and that is why this guide is designed to provide the best information available so there is less work for you.

**EPP is best value.** When a product creates too much pollution this impact is a cost to those who have to clean it up or get sick from it. The lowest price isn't necessarily the lowest cost. That is what EPP tries to sort out.

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<sup>4</sup> California Public Contract Code, sections 12400-12404 (AB 498, Chan, Chapter 575, Statutes of 2002), <http://www.leginfo.ca.gov/calaw.html>

<sup>5</sup> US EPA, web page *EPP Terms*, <http://www.epa.gov/opptintr/epp/about/epptterms.htm>

<sup>6</sup> California Public Contract Code, sections 12400-12404 (AB 498, Chan, Chapter 575, Statutes of 2002), <http://www.leginfo.ca.gov/calaw.html>

**EPP is high-quality performance.** When a product performs poorly it creates waste and this goes against the very definition of EPP. In other words, a poorly performing product is not environmentally preferable!

## EPP in Practice

Environmentally preferable purchasing is policy in numerous places in the United States and abroad. As other locations demand environmentally preferable products, locations not setting similar standards risk becoming a dumping ground for products with less desirable environmental attributes. Californians benefit from policies that help keep products with harmful constituents out of our homes and workplaces, and an increase in demand for environmentally preferable products helps encourage manufacturers to create more of them.

Here is a sampling of organizations actively pursuing EPP:

### CALIFORNIA

- City and County of [San Francisco](#)
- City of [Santa Monica](#)
- [Alameda](#) County
- Nevada County
- [Ventura](#) County

### UNITED STATES

Federal government

- Air Force
- Defense Logistics Information Service
- Department of Energy, [Energy Star](#)
- [Environmental Protection Agency](#)
- Federal Network for Sustainability (**Note:** This is not a governmental agency. It is a voluntary, collaborative network of Federal agencies in the Western United States focused on fostering and furthering the concept of sustainability within the government through their individual programs and group initiatives.)

### States

- [Massachusetts](#)
- [Michigan](#)
- [Minnesota](#)
- [North Carolina](#)
- [Ohio](#)
- [Pennsylvania](#)
- [Vermont](#)

### Counties and Cities

- [New York](#), NY
- [King County](#), WA

### Non-governmental Organizations

- [Health Care Without Harm](#)
- [GreenBlue](#)

- [Sustainable Packaging Coalition](#)

## INTERNATIONAL

- [Asia Pacific](#) (China, Japan, Korea, Malaysia)
- European Commission
- European Union
- [Canada](#) Environmental Choice
- [Germany](#) Blue Angel
- Japan
- Malaysia
- Organization for Economic Co-operation and Development ([OECD](#))
- [Sweden](#)
- [United Kingdom](#)
- Vienna, Austria

## PRIVATE SECTOR

- [Environmental Defense's Fund + Business](#) (Hyperlink to <http://business.edf.org/>)

## Understanding Core Principles of Environmentally Preferable Purchasing

- **Product Life Cycle Assessment (LCA)**
- **Cradle to Cradle™ (C2C) product design**
- **Benefits to human health, the environment, and economy**

Part of the reason that EPP is being [practiced](#) by more and more organizations is that it is built upon core principles that benefit our economy, environment, and society. Consequently, although information gaps exist, by using a continual improvement process, better purchasing decisions will be made in the years to come.

Each of the topics below is an expansive field of study. Below are brief descriptions and additional resources.

- **PRODUCT LIFE CYCLE ASSESSMENT (LCA)**

Life cycle assessment is a "cradle-to-grave" approach for assessing the environmental aspects and potential impacts associated with a product. "Cradle-to-grave" begins with the gathering of raw materials from the earth to create the product and ends at the point when all materials are returned to the earth. LCA enables the estimation of the cumulative environmental impacts resulting from all stages in the product life cycle, such as raw material extraction, material transportation, product use, and ultimate product disposal. By including the impacts throughout the product life cycle, LCA provides a comprehensive view of the environmental aspects of the product.

The LCA technique assesses environmental aspects and impacts by:

- Compiling an inventory of relevant energy and materials inputs and environmental releases,
- Evaluating the potential environmental impacts associated with identified inputs and releases, and
- Interpreting the results to make a more informed decision.

In practice, LCA can be expensive to perform, but costs are coming down as LCA is more widely used. Furthermore, there are several software tools available that make the analysis easier. LCA has been manipulated by some organizations to provide desirable results so anyone using LCA should consider how the analysis was funded and if it is from a non-biased source.

The United States Environmental Protection Agency has available an [introduction to LCA](#), case studies and resources.<sup>7</sup> There is an International Standard on Life Cycle Assessment in the [International Standards Organization](#)'s Environmental Management Standards ISO 14000 series, found in ISO 14040.

- **CRADLE TO CRADLE™ (C2C) PRODUCT DESIGN**

In contrast to a "Cradle to Grave" approach, the C2C approach reorients the design of products and systems so waste from one process becomes an input to another. Waste equals food. There is no grave. This is accomplished by designing products and systems so materials can flow in closed-loop cycles as either biological nutrients or technical nutrients (e.g., metals and chemicals). In a C2C world, products are designed for reuse and recycling so materials can be separated from one another to eliminate contamination. If everything is reused, there is zero waste.

Expect to hear more about the C2C design, developed by William McDonough and Michael Braungart, as more Fortune 500 companies design products and systems using a C2C approach. In China, C2C is being used in the design of several new cities and as an industrial protocol.<sup>8</sup> In the summer of 2005, C2C certification became available for materials and products.<sup>9</sup>

In practice, C2C products may not be realized initially and it may be viewed as a long term vision for our industrial society. C2C forces product and systems redesign. The C2C movement can be expected to provide much better information on materials, which will assist product designers.

McDonough Braungart Design Chemistry (MBDC) created and developed the C2C approach, along with the [C2C certification](#) program.

- **BENEFITS TO HUMAN HEALTH, THE ENVIRONMENT, AND ECONOMY**

EPP provides a variety of benefits that can range from financial, human health and the environment, to larger societal benefits.

Financial costs and benefits are the easiest to quantify. The purchasing price and frequency of purchase is weighed against operating costs, maintenance repair and replacement costs, occupational health costs, and liability. In contrast, environmental and societal costs and benefits are much harder to quantify and incorporate into decision making.

Commonly cited benefits include reduced air pollution and water emissions, materials and energy efficiency, less waste in landfills, reductions in hazardous and toxic substances, increased durability, etc. Many times we can't place a specific value to the benefits without extensive study. That is why there is legislation that directs the creation of allowable emissions or bans

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<sup>7</sup> <http://www.epa.gov/nrmrl/std/lca/lca.html>

<sup>8</sup> <http://www.metropolismag.com/cda/story.php?artid=1130>

<sup>9</sup> <http://mbdc.com/detail.aspx?linkid=2&sublink=8>

certain substances. It would be cost-prohibitive to analyze costs and benefits for individual situations.

EPP considers a product over its entire life, from raw material extraction to transport, use, and final end-of-use management or disposal. The analysis acknowledges direct and indirect environmental, health, and financial costs. Consequently, a product that has a lower initial purchase price than a similar but more environmentally preferable product, may cost more over the long term.

Unfortunately, complete analysis of the costs and benefits is quite rare and can be expensive. The result is that most emphasis is placed on the easy-to-obtain initial purchase price or “first cost,” followed by operations and maintenance costs. As we become more sophisticated in analyzing a fuller range of benefits, better decision making can result. Fortunately, there are a variety of software tools that can assist in this analysis and over time we can expect to see better analysis.

Economic benefits include but are not limited to:

- Reducing materials consumption
- Providing a useful outlet for collected recycled material
- Reducing greenhouse gas emissions
- Conserving water
- Conserving energy
- Increasing the use of renewable products
- Reducing the presence of toxic and hazardous substances in the workplace and environment

These benefits in turn:

- Improve public and occupational health and safety
- Improve wildlife habitats
- Decrease air, water, and soil contamination
- Improve compliance with regulations
- Decrease costs associated with waste management, disposal, and cleanup
- Promote a sustainable economy
- Develop markets for environmentally preferable goods and services<sup>10</sup>

Here are some examples of where economic benefits exist:

- Avoiding hazardous substances and preventing pollution can reduce health and disposal costs and regulatory liability.
- Reusable, refillable, durable, and repairable products are usually more cost-effective over time than single-use or disposable products.<sup>11</sup>
- Conserving energy is a simple and effective way to save money.
- Purchasing copiers and printers that are capable of duplex printing can reduce paper costs.
- Some recycled-content products (RCP) – such as janitorial paper products, corrugated packaging, padded mailers, latex paint, compost, mulch, remanufactured toner cartridges, and many others – are priced the same as or less than their non-recycled counterparts. Some durable RCPs, such as recycled plastic lumber and rubberized

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<sup>10</sup>United States Environmental Protection Agency, *WasteWise Update, Environmentally Preferable Purchasing*, July 2001, EPA 530-N-01-002, p. 3. Available at: <http://www.epa.gov/smm/wastewise/pubs/wwupda15.pdf>.

<sup>11</sup> Solid Waste Management Coordinating Board of Minnesota. *Environmentally Preferable Purchasing Guide, Introduction Page*. See: <http://www.rethinkrecycling.com/government/eppg>.











asphalt, often cost more initially than comparable non-RCPs; however, they have lower overall costs because they are more durable and require less maintenance.


- Buying recycled products supports the economy. Diversion creates twice as many jobs, double the income, and twice the sales per ton of material than does disposal.<sup>12</sup>
- Using water efficiently reduces the cost of pumping, heating, and treating water.

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<sup>12</sup> State of California. California Integrated Waste Management Board. Recycling Market Development Zones Online Resources Web Page. See: <http://www.ciwmb.ca.gov/RMDZ/Resources/>.

## Environmental Attributes and Symbols Used in this Guide

Environmental Attributes and Other Considerations	
	<a href="#"><u>Less Hazardous</u></a>
	<a href="#"><u>Conserves Energy</u></a>
	<a href="#"><u>Recycled Content</u></a>
	<a href="#"><u>Prevents Waste</u></a>
	<a href="#"><u>Air Quality</u></a>
	<a href="#"><u>Low Volatile Organic Compounds (VOC)</u></a>
	<a href="#"><u>Conserves Water</u></a>
	<a href="#"><u>End-of-Life Management</u></a>
	<a href="#"><u>Waste/Materials Management</u></a>
	<a href="#"><u>Material Availability</u></a>
	<a href="#"><u>Global Warming</u></a>
	<a href="#"><u>Responsible Manufacturers</u></a>

<b>Environmental Attributes/Considerations and Symbols Used in this Guide</b>	
<b>Symbols Used in this Guide:</b> This chart contains a discussion of environmental attributes and considerations. Symbols have been assigned to most of these topics. The symbols are used throughout this guide to help you quickly identify the most accepted environmental and health issues related to a particular product. These symbols also help identify the advantages that environmentally preferable products offer compared to similar products. <sup>13,14</sup>	
<p><i>Note: Some of the text and information in this chart was borrowed from the Solid Waste Management Coordinating Board of Minnesota<sup>15</sup> and the State of Washington<sup>16</sup>.</i></p>	
 <b>Less Hazardous</b>	<p>Avoiding hazardous products improves workers' safety, reduces pollution and regulatory liability, and lowers disposal costs.<sup>17</sup> Typical hazardous substances are toxic, corrosive, irritants, strong sensitizers, or are flammable or combustible.<sup>18</sup></p> <p>Avoid products labeled with the following signal words:</p> <ul style="list-style-type: none"> <li>• Caution: mild to moderate hazard</li> <li>• Warning: moderate hazard</li> <li>• Danger: corrosive, extremely flammable, or highly toxic</li> <li>• Poison: highly toxic</li> </ul> <p>If a non-hazardous alternative is not available, choose the least hazardous product; follow the directions on the label; use the least amount possible needed to accomplish each task; use up all of the product; and dispose of the container properly.</p> <p>Avoid products that require the use of hazardous substances for their maintenance.</p>

<sup>13</sup> Solid Waste Management Coordinating Board of Minnesota. *Environmentally Preferable Purchasing Guide, Introduction Page*. See: <http://www.rethinkrecycling.com/government/eppg>.



<sup>14</sup> State of Washington. Office of State Procurement, Department of General Administration and the Department of Ecology. *Environmentally Preferable Purchasing Reference Guide*, August 2003, p. 3. Available at: <http://www.ga.wa.gov/PCA/Forms/EPP-Manual.pdf>.

<sup>15</sup> Solid Waste Management Coordinating Board of Minnesota. *Environmentally Preferable Purchasing Guide*. Available at: <http://www.rethinkrecycling.com/government/eppg>.

<sup>16</sup> State of Washington. Office of State Procurement, Department of General Administration and the Department of Ecology. *Environmentally Preferable Purchasing Reference Guide*, August 2003. Available at: <http://www.ga.wa.gov/PCA/Forms/EPP-Manual.pdf>.



<sup>17</sup> State of California. California Integrated Waste Management Board. *Environmentally Preferable Purchasing Home Page*. See: <http://www.ciwmb.ca.gov/epp/>.

<sup>18</sup> California Health and Safety Code section 108125. Available at <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=108001-109000&file=108100-108225>.

 <b>Conserves Energy</b>	<p>In 2000, each person in California used about 7,178 kilowatt-hours of electricity.<sup>19</sup> Reducing energy use is a simple and effective way to save money, keep our <a href="#">air</a> clean, protect the environment, and combat <a href="#">global warming</a>. Many forms of energy production have negative effects on human health and the environment, such as air pollution, greenhouse gas emissions, acid rain, habitat degradation, and toxic spills and releases.</p> <ul style="list-style-type: none"> <li>• Look for products that have low embodied energy (the energy that goes into producing a product) and do not require energy to operate, or if they do, they use energy efficiently.</li> <li>• Look for the federal government's <a href="#">Energy Star</a> label that helps buyers identify energy-efficient products.</li> <li>• Visit California's <a href="#">Flex Your Power</a> Web site for energy-saving tips.</li> <li>• California has <a href="#">appliance efficiency regulations</a>.</li> </ul>
 <b>Recycled Content</b>	<p>Buying recycled-content products (RCP) creates demand for recyclables from local collection programs; reduces waste going to landfills; creates jobs; and conserves natural resources. In addition, many RCPs take less energy to produce than their virgin counterparts.</p> <p>Total recycled content = postconsumer content + secondary content.</p> <p>Postconsumer material comes from products that are used by consumers and then recycled; therefore, using postconsumer material directly supports the recycling programs of local jurisdictions. Secondary material consists of fragments of finished products or finished products of manufacturing processes, and this material is recycled before it reaches consumers.</p> <p>Use <a href="#">State contracts</a>, <a href="#">California Multiple Award Schedules (CMAS) contracts</a>, and the <a href="#">Recycled-Content Product Directory</a> to find products that meet or exceed the <a href="#">State Agency Buy Recycled Campaign</a>'s minimum content requirements, and those that contain the highest amount of postconsumer material.</p> <p>In addition, the United States Environmental Protection Agency (US EPA) sets recycled-content levels for a variety of products through its <a href="#">Comprehensive Procurement Guidelines</a> program. If a federal, state, or local agency (or its contractors), spends more than \$10,000 a year on a US EPA-designated item, and part of that money is from appropriated federal funds, then that item must be a recycled product.<sup>20</sup></p>

<sup>19</sup> State of California. California Energy Commission. US Per Capita Electricity Use By State in 2000 Web Page. See: <http://apps1.eere.energy.gov/states/residential.cfm/state=CA>.

<sup>20</sup> United States Environmental Protection Agency. Comprehensive Procurement Guidelines Frequently Asked Questions Web Page. See: <http://www.epa.gov/epawaste/conserve/tools/cpg/index.htm>.


 <p><b>Prevents Waste</b></p>	<p>Californians dispose of tens of millions of tons of waste each year.<sup>21</sup> Much of this waste comes from disposable and over-packaged products.</p> <p>Preventing waste (“Waste prevention” is also known as “<b>source reduction</b>.”) can conserve natural resources and save landfill space. You prevent waste when you:</p> <ul style="list-style-type: none"> <li>• Reduce the amount of material you buy to accomplish any task;</li> <li>• Reuse a product in its original form; or</li> <li>• Use repairable, refillable, or durable products.</li> </ul> <p>Look for products that either weigh less as compared to alternatives that perform the same function, or otherwise result in less materials that must be managed, while being reusable or recyclable, without additional toxic or hazardous substances, and with better or equal durability, easy maintenance, and good performance. Good product design is at the heart of source reduction.</p>
 <p><b>Air Quality</b></p>	<p>Reducing air emissions – both outdoors and indoors – is a primary concern for all Californians. According to the California Air Resources Board, “despite significant success in reducing overall pollution levels, air pollution continues to be an important public health problem. Air monitoring shows that over 90 percent of Californians breathe unhealthy levels of one or more air pollutants during some part of the year.”<sup>22</sup></p> <p>Sources of outdoor air pollution include fuel-burning motor vehicles and equipment, windblown dust from roadways, agriculture, and construction; industrial processes, pesticides, fireplaces, woodstoves, and businesses, such as dry cleaners and service stations.<sup>23</sup></p> <p><b>Indoor Air Quality (IAQ)</b></p> <p>Sources of indoor air pollution include heaters, fireplaces, chimneys, wood and gas stoves, consumer products, such as those used for household cleaning and maintenance, personal care, and hobbies; biological contaminants, radon, tobacco smoke, furniture, and building materials and products.<sup>24</sup></p> <p>“Americans spend on average more than 80 to 90 percent of their time indoors. Over the past decade, concerns over indoor air quality have been well documented, along with effective solutions. Indoor pollutants can cause building occupants to experience acute discomfort and negative health effects, such as respiratory irritation, headaches, fatigue, etc. Some substances, like radon and carbon monoxide, can pose fatal risks ...</p>

<sup>21</sup> State of California. California Integrated Waste Management Board. Local Government Central, Total Waste Generated, Diverted and Disposed, California, 1989-2004 Web page. See: <http://www.ciwmb.ca.gov/lgcentral/Rates/Graphs/TotalWaste.htm>.

<sup>22</sup> State of California. California Air Resources Board. *Fact Sheet: Air Pollution and Health*. Available at <http://www.arb.ca.gov/research/health/fs/fs1/fs1.htm>.

<sup>23</sup> Ibid.

<sup>24</sup> United States Environmental Protection Agency. Basic Information About Indoor Air Quality Web Page. See: <http://www.epa.gov/iaq/ia-intro.html>.

	<p>enhanced IAQ potentially averts serious health issues and can save enormous sums of money required to treat them. In commercial environments, improving IAQ has been shown to increase worker productivity by up to 16 percent. Because labor accounts for up to 92 percent of the life-cycle building costs (far outweighing energy), the value of increased worker productivity can be significant. Furthermore, occupant satisfaction and healthfulness represent important, though difficult to measure, benefits of improved IAQ.”<sup>25</sup></p> <ul style="list-style-type: none"> <li>• Learn more about indoor air quality from the <a href="#">California Air Resources Board</a>.</li> <li>• Look for products that emit zero or low amounts of <a href="#">volatile organic compounds</a>.</li> <li>• Look for products that <a href="#">conserve energy</a>, since burning fossil fuels produces air pollution.</li> </ul>
 <p><b>Low Volatile Organic Compounds (VOC)</b></p>	<p>Choosing products with low or no VOCs reduces <a href="#">indoor air quality</a> hazards for employees. Concentrations of many VOCs are consistently higher indoors than outdoors.<sup>26</sup> VOCs are carbon-containing compounds that evaporate into the air (with a few exceptions). They contribute to the formation of smog and/or may themselves be toxic.<sup>27</sup> Adverse health effects include eye, nose, and throat irritation; headaches, loss of coordination, nausea; damage to the liver, kidneys, and central nervous system; some are suspected or known to cause cancer in humans.<sup>28</sup></p> <p>VOCs often have an odor, and sources of VOCs include paints, cleaning products, pesticides, building materials and furnishings, office equipment, such as copiers and printers; correction fluids, carbonless copy paper, adhesives, and permanent markers.<sup>29</sup> Low-VOC versions of many of these products are readily available.</p>

<sup>25</sup> *Building and Buying Green in Indian Country: A Practical Guide for California Tribes*. May 2004, p. 141.



Prepared for the California Integrated Waste Management Board by the Center for Indian Community Development, The Center for Environmental Economic Development, and Boisson & Associates. Available at <http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1069>.

<sup>26</sup> United States Environmental Protection Agency. Indoor Air Quality, Sources of Indoor Air Pollution - Organic Gases, (Volatile Organic Compounds - VOCs) Web Page. See: <http://www.epa.gov/iaq/voc.html>.

<sup>27</sup> State of California. California Air Resources Board. *Glossary of Air Pollution Terms*. Available at <http://www.arb.ca.gov/html/gloss.htm>.

<sup>28</sup> United States Environmental Protection Agency. Indoor Air Quality, Sources of Indoor Air Pollution - Organic Gases, (Volatile Organic Compounds - VOCs) Web Page. See: <http://www.epa.gov/iaq/voc.html>.

<sup>29</sup> Ibid.

 <b>Conserves Water</b>	<p>Selecting products and services that conserve water can reduce sewer and water bills. In addition, efficient water use reduces the need for expensive water supply and wastewater treatment facilities, helps maintain healthy aquatic and riparian environments, and reduces the energy needed to pump, treat, and heat water.<sup>30</sup> Water is used in the manufacture of products, during a product's use, and in cleaning. Consequently, water efficiency and pollution prevention can occur in several product life cycle stages.</p> <ul style="list-style-type: none"> <li>• Less than one percent of the Earth's water is readily available for human use.</li> <li>• Each person in California uses about 200 gallons (includes indoor and outdoor use) of water per day.<sup>31,32</sup></li> </ul>
 <b>End-of-Life Management</b>	<p>When selecting a product, consider what will happen to it at the end of its useful life. Can it be recycled easily? Does the manufacturer have a take-back program? Does it require special disposal because it contains hazardous chemicals? A product with a lower purchase price may cost more in the long run because of higher disposal, health, and safety costs.</p>
<b>Waste/Materials Management</b>	<p>Californians generate an estimated 76 million tons of waste each year.<sup>33</sup> As we strive to be a <a href="#">zero waste</a> state, we must manage this waste by first preventing waste whenever possible and managing all "waste" materials to their highest and best use.</p> <p>The California Integrated Waste Management Act of 1989 (<a href="#">Public Resources Code section 40050 et seq.</a>), also known as Assembly Bill (AB) 939, established a 50 percent waste diversion (diversion from landfills) goal for local government based on an integrated waste management hierarchy that prioritized waste prevention and recycling over all other options. It also enhanced public outreach programs and environmental education curricula and improved landfill safety requirements and protection for public health and the environment.<sup>34</sup></p> <p><a href="#">AB 75</a> (Strom-Martin), Statutes of 1999, Chapter 764, requires each State agency and large State facility to meet a 50 percent diversion goal, also.</p> <p>Effective materials management keeps waste out of landfills and prevents the impacts associated with the extraction of raw materials. Extending the life of landfills reduces the pace at which new ones must be sited, along with the very significant costs associated with siting landfills and long term maintenance and operations, closure, and monitoring.</p>

<sup>30</sup> United States Environmental Protection Agency. WaterSense. See: <http://www.epa.gov/owm/water-efficiency/>.

<sup>31</sup> Central Basin Municipal Water District, West Basin Municipal Water District, and Educational Development Specialists. *Conservation Connection: Water & Energy Use in California. A Curriculum Analyzing Water & Energy Use At Home and At School*, 2004, p. 9.

<sup>32</sup> United States Environmental Protection Agency. How We Use Water In These United States Web Page.

<sup>33</sup> State of California. California Integrated Waste Management Board. Home Page. See: <http://www.ciwmb.ca.gov/>.

<sup>34</sup> State of California. California Integrated Waste Management Board. *2001 Strategic Plan, Executive Summary*. Available at <http://www.ciwmb.ca.gov/BoardInfo/StrategicPlan/2001/ExecSumm.htm>.

<b>Material Availability</b>	<p>Ultimately, everything that we use comes from the Earth. Any time we reduce the extraction of natural resources – by cutting down fewer trees, mining fewer minerals, or pumping less oil from the ground – we may reduce our impact on the environment and human health, and save resources for future generations. We can use our material resources more efficiently through source reduction, using less virgin material, applying material-efficient product design, reducing waste during manufacturing, and using materials that have been diverted from the waste stream to manufacture new products.</p>
<b>Global Warming</b>	<p>In the United States, most of the greenhouse gas emissions (about 82%) are from burning fossil fuels to <a href="#">generate electricity</a> and power our cars.<sup>35</sup></p> <p>Increased human emissions of greenhouse gases are accelerating global warming, and California is particularly vulnerable to the impacts of climate change. Increased temperatures threaten to greatly reduce the Sierra snowpack, one of the State's primary sources of water. Increased temperatures also threaten to further exacerbate California's air quality problems and adversely impact human health by increasing heat stress and related deaths, the incidence of infectious disease, and the risk of asthma, respiratory and other health problems. Rising sea levels threaten California's 1,100 miles of valuable coastal natural habitats and real estate. The combined effects of an increase in temperatures and diminished water supply and quality threaten to alter micro-climates within the state, affect the abundance and distribution of pests and pathogens, and result in variations in crop quality and yield.<sup>36</sup></p> <p>Find out how you can help prevent global warming at the following Web sites:</p> <ul style="list-style-type: none"> <li>• <a href="#">California's Flex Your Power Web Site</a></li> <li>• <a href="#">United States Environmental Protection Agency's Global Warming Actions Web Page</a></li> </ul>
<b>Responsible Manufacturers</b>	<p>Consider products provided by manufacturers that demonstrate commitment to environmental protection and improvement by any or all of the following:</p> <p><u>Environmental Policy</u> The manufacturer has a written environmental policy that is consistent with requirements in the voluntary <a href="#">ISO 14001 - Updated to ISO 50001</a> International Standard on Environmental Management Systems (EMS), including a stated commitment to comply with environmental legislation and regulations as well as a commitment to continual improvement and prevention of pollution.</p> <p><u>Environmental Management System</u> The product manufacturer certifies that all its manufacturing facilities have third-party registered ISO 14001 Environmental Management Systems.</p> <p><u>Corporate Reporting Based on Global Reporting Initiative (GRI)</u></p>

<sup>35</sup> Flex Your Power Campaign. Energy Efficiency Helps Combat Climate Change Web Page. See: <http://www.fypower.com/feature/climate/>.

<sup>36</sup> From California Executive Order S-3-05. Available at <http://gov.ca.gov/news.php?id=1861>.



	<p>The product manufacturer produces an annual public report that includes, but is not limited to, elements of the <a href="#">Global Reporting Initiative</a> (GRI) Sustainability Guidelines.</p> <p>State of California Environmental Awards The product manufacturer or supplier has been recognized in California for their environmental practices as a recipient of the <a href="#">Governor's Environmental and Economic Leadership Award Program</a> and/or recognized through the California Integrated Waste Management Board's <a href="#">Waste Reduction Awards Program</a>.</p>
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## Using this Guide to Select Environmentally Preferable Products

Use this Guide to help you:

- Choose more environmentally preferable products and services in numerous categories.
- Write environmental specifications into your bid solicitations.
- Tap into Web sites and other resources related to environmentally preferable purchasing.
- Identify ways you can reduce waste in your office, shop, or facility.
- Locate surplus and reuse programs to obtain low-cost or used equipment and supplies.

The subject matter specific sections\* of the Guide cover specific products and services commonly purchased by government. To help you make informed purchasing decisions, the following topics will be addressed for each product or service:

- general product **Background**
- related **Environmental and Health Issues**
- applicable **Laws and Guidelines**
- history of **Performance**
- **Cost** considerations
- product **Vendors**
- sample **Specifications**
- additional **Resources and Web Sites**<sup>37</sup>

\*Subject matter specific sections will be added over the next few months. The first one that is available covers [copier paper](#), and future sections will cover the full range of products and services that State agencies use, including, but not limited to, office supplies and machines, vehicles and other transportation-related products, outdoor furnishings, maintenance and operations products, and building materials. Please stay tuned!

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<sup>37</sup> Ibid.

## Existing Laws, Mandates, and Guidelines

### CALIFORNIA

Statutes, regulations, executive orders, and guidelines direct the State of California to practice and promote EPP. This demonstrates the state's commitment to leading by example to protect public health and the environment and support markets for environmentally preferable products and services.

Please note that the following discussion is not comprehensive. Mandates and guidelines that relate to specific products, substances, and services are referenced throughout this manual within the subject matter specific chapters.

- [Environmentally Preferable Purchasing Law](#)
- [State Agency Buy Recycled Campaign](#)
- [State Agency Waste Diversion](#)
- [Executive Order S-20-04](#)
- [Executive Order S-7-04](#)
- [Executive Order S-3-05](#)
- [Regulations and Guidelines](#)
- [Federal Executive Order 13101](#)

**Environmentally Preferable Purchasing Law:** [Public Contract Code sections 12400-12404](#)  
[AB 498 (Chan), Statutes of 2002, Chapter 575]

The EPP law, enacted in September 2002, directs the Department of General Services (DGS), in consultation with the California Environmental Protection Agency (Cal/EPA), members of the public, industry, and public health and environmental organizations, to provide state agencies with information and assistance regarding EPP including, but not limited to, the following:

- The promotion of EPP.
- The development and implementation of a strategy to increase EPP. This may include the development of statewide policies, guidelines, programs, and regulations.
- The coordination with other state and federal agencies, task forces, workgroups, regulatory efforts, research and data collection efforts, and other programs and services relating to EPP.
- The development and implementation, to the extent fiscally feasible, of training programs designed to instill the importance and value of EPP.
- The development, to the extent fiscally feasible, of an EPP best practices manual for state purchasing employees.

The Secretary of the State and Consumer Services Agency, in consultation with the Cal/EPA, established the [Environmentally Preferable Purchasing Task Force](#) to develop a strategy to achieve the goals set forth in AB 498. The task force comprises representatives from various State agencies with specific fiscal, procurement, and environmental policy expertise.

### State Agency Buy Recycled Campaign

The State Agency Buy Recycled Campaign (SABRC), set forth as State Assistance for Recycling Markets, [Public Contract Code sections 12150 et seq.](#), is implemented jointly by the DGS and the California Integrated Waste Management Board (CIWMB) and requires State agencies and the Legislature to purchase products with recycled content. It complements the efforts of the [Integrated Waste Management Act](#) [AB 939 (Sher), Statutes of 1989, Chapter 1095], and the statute regarding State agency waste diversion [AB 75 (Strom-Martin), Statutes of 1999, Chapter 764] which were enacted to reduce the amount of waste going to California's landfills.

Additional information regarding the SABRC is available in [Chapter 3 of the Purchasing Authority Manual](#) and from the [CIWMB](#).

SABRC reporting may be automated in the future.

### **State Agency Waste Diversion**

Public Resources Code sections 42920 et seq. requires each State agency and large State facility to divert 50 percent of its waste from landfills or transformation facilities by January 1, 2004. State agencies implement a wide variety of programs to meet the diversion mandates. Reported programs range from source reduction to full recycling programs which request, and in some cases require, employees, contractors, and visitors to recycle.

### **Executive Order S-20-04**

California's [Green Building Executive Order](#) (Executive Order S-20-04) established the State's priority for energy and resource efficient high performance buildings. It directs the State to commit to aggressive action to reduce State building electricity usage by retrofitting, building, and operating the most energy and resource efficient buildings by taking all cost-effective measures described in the [Green Building Action Plan](#) for facilities owned, funded or leased by the State. Cities, counties, schools, and commercial building owners and operators are encouraged to do the same.

One significant measure that is mentioned in this Order is for the State to design, construct, and operate all new and renovated State-owned facilities paid for with State funds as "LEED Silver" or higher certified buildings. LEED – the [U.S. Green Building Council's](#) Leadership in Energy and Environmental Design rating system – is the nation's leading green building rating system. It promotes "high performance" building practices; energy, water and materials conservation; environmentally preferable products and practices; improvements in employee health, comfort and productivity; and reductions in facility operation costs and environmental impacts.

### **Executive Order S-7-04**

Governor Schwarzenegger's [Hydrogen Highway](#) vision sets forth a blueprint for government and private agencies to work together in planning and building a hydrogen infrastructure. In his signing message, he stated "The goal of the California Hydrogen Highway Network initiative is to support and catalyze a rapid transition to a clean, hydrogen transportation economy in California, thereby reducing our dependence on foreign oil, and protecting our citizens from health harms related to vehicle emissions. We have an opportunity to deal with these problems by investing in California's ability to innovate our way to a clean hydrogen future, thus bringing jobs, investment, and continued economic prosperity to California. We have an opportunity to prove to the world that a thriving environment and economy can co-exist."

In the months that followed, a group of some 200 volunteers from auto companies, energy companies, fuel cell manufacturers, government agencies, non-governmental organizations and others worked in a well-orchestrated set of task forces to develop the [California Hydrogen Highway Blueprint](#).

The [California Hydrogen Highway Web site](#) provides information and resources about hydrogen fueling stations planned for the State's twenty-one interstate freeways.

### **Executive Order S-3-05**

[Executive Order S-3-05](#) established the following [greenhouse gas](#) (GHG) emission reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels. The Secretary of the California Environmental Protection Agency is charged with the coordination of the oversight of efforts to achieve these targets.

## **Regulations and Guidelines**

Aside from the aforementioned laws and executive orders, there are state laws and regulations that address:

- energy efficiency
- water conservation
- specific substances that pose health, safety, or environmental problems
- integrated waste management

Energy efficiency regulations limit the amount of energy and water that various products may use. Water conservation is covered in the energy efficiency regulations because water use (pumping and treatment) in California consumes significant amounts of electrical energy.<sup>38</sup> Whenever we use less water, we save energy.

Substances and materials of concern generally are identified as toxic or hazardous, or pose unique environmental problems, such as waste disposal safety issues. These substances may directly or indirectly contaminate our land, water or air resources and end up harming people and the environment.

Products that have associated mandates run the gamut and include paper, consumer products, electronic equipment, building materials, and pesticides.

In addition to the aforementioned mandates, various state agencies are directed to provide information and recommendations to the public. Consequently, there are various guidelines that identify products and practices that result in less energy or water use, zero waste, and reduced air or water emissions. To the extent it is feasible and cost effective, state purchasing officials are encouraged to follow any such guidelines.

## **FEDERAL**

### **Federal Executive Order 13101 of September 14, 1998: Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition**

Federal [Executive Order 13101](#) strengthens and expands the Federal government's commitment to recycling and buying recycled-content and environmentally preferable products. Among other things, it:

- Defines key terms;
- Elevates implementation of waste prevention and recycling activities to a new, White House-level Steering committee;
- Discontinues all government purchases of printing and writing paper not containing 30 percent postconsumer fiber by the end of 1998;
- Provides new ways for the Federal government to build markets for environmentally preferable products and services;

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<sup>38</sup> State of California. California Energy Commission. Public Interest Energy Research Program. See: <http://www.energy.ca.gov/research/iaw/water.html>.

- Increases government purchases of bio-based products to develop markets for these items;
- Requires all Federal facilities to comply with recycling and recycled content purchasing requirements under the Federal Facility Compliance Act;
- Requires agencies to establish long-term goals both for waste prevention and recycling and for buying recycled and environmentally preferable products.<sup>39</sup>
- Directs federal agencies to track and measure results and to report progress.<sup>40</sup>

### EPP Practitioners at the Federal Level

## Acquiring Environmentally Preferable Products

### FINDING EXISTING ENVIRONMENTALLY PREFERABLE PRODUCTS

Environmentally preferable products are those products that have a lesser or reduced effect on human health and the environment when compared with other products that serve the same purpose. A review of the guiding principles and available products and sources will help you acquire products that meet these requirements.

### GUIDING PRINCIPLES

Questions to ask before purchasing a product include:

- Is the product less hazardous?
- Is it reusable or more durable?
- Is it made from recycled materials? Do we really need to buy a virgin product when the recycled version is just as good?
- What happens to the product at the end of its life? Can it be recycled? Will the manufacturer take the product back? Will it need special disposal?
- Does it conserve energy or water?
- What is needed to properly maintain and/or operate this product?
- Have its environmental attributes been certified by a non-biased, widely-accepted source?

“Depending upon which product you are buying, all or only a few of these questions will apply. One challenge in buying wisely is knowing which questions to ask. With the Guide helping to put environmental issues in context, asking these questions will become second nature.”<sup>41</sup>

### AVAILABLE PRODUCTS AND SOURCES

The California Department of General Services develops and administers contracts for goods and services that have environmental attributes. Many of these contracted products and services are healthier and safer for people, and protect the environment. Local governments have access to these contracts as well. These contracts are available on the Procurement Division’s Web site at:

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<sup>39</sup> United States Environmental Protection Agency, Office of Enforcement and Compliance Assurance. *The Yellow Book: Guide to Environmental Enforcement and Compliance at Federal Facilities* (1999), II-149 – II-150. Available at <http://www.epa.gov/compliance/resources/publications/civil/federal/yellowbk.pdf>.

<sup>40</sup> United States Environmental Protection Agency, Office of Solid Waste and Emergency Response. *Federal Agencies: Teaming Up with WasteWise* (1999).

<sup>41</sup> Solid Waste Management Coordinating Board of Minnesota. *Environmentally Preferable Purchasing Guide, Introduction Page*. See: <http://www.rethinkrecycling.com/government/eppg>.

- [Statewide Contracts](#)
- [Statewide Contracts for Recycled-Content Products](#)

For information on using a particular Statewide contract, review the contract or contact the DGS buyer named in the contract.

- [California Multiple Award Schedules \(CMAS\) Green/Recycled Content Contractors](#)

For information on using CMAS contracts, visit the [How to Use the CMAS Contract Lists Web page](#) or contact a [CMAS Representative](#).

The United States Environmental Protection Agency maintains a [Database of Environmental Information for Products and Services](#) <http://yosemite1.epa.gov/oppt/eppstand2.nsf/Pages/Homepage.html?Open> — a tool to make it easier to purchase products and services with reduced environmental impacts. Environmental information on hundreds of products and services is included in this database.

This database will help you buy greener products and services by linking you to:

- Samples of contract language, specifications, and policies created and used by federal and state governments and others to buy environmentally preferable products and services.
- Environmental standards and guidelines for the product you want to buy.
- Vendor lists of product brands which meet these standards.
- Other useful sources of information on the environmental preferability of products and services (e.g., EPP Updates, guidance documents, fact sheets, EPP case studies, and miscellaneous information useful to government purchasers).

## **DEVELOPING COMPETITIVE SPECIFICATIONS FOR ENVIRONMENTALLY PREFERABLE PRODUCTS**

Many state and local governments are required to develop competitive specifications for the products they are acquiring. These specifications typically identify physical and performance features of the product. In developing these specifications, one can follow a structured approach to meeting both the needs of the end user and the needs of the environment. This approach consists of:

- [Needs Assessment](#)
- [Developing Green Specifications](#)
- [Using Existing Standards](#) (Green Seal, Energy Star, etc.)
- [Life Cycle Cost Assessment](#)
- [Best Value Assessment](#)

## **NEEDS ASSESSMENT**

When developing specifications, the very first thing that should be assessed is the need for the product. This involves determining:

- Why do you need the product?
- How is the product going to be used?
- What is the product going to be used for?
- Who is going to use the product?
- What products are available on the market?

Answering these questions will help you determine the actual requirements of the product you are about to acquire.

## DEVELOPING GREEN SPECIFICATIONS

In developing your specifications, you will be identifying and prioritizing these requirements into a biddable document. This list of requirements should include a description of the physical and performance characteristics of the product. You should also identify any or all of the environmental requirements of the product. Examples include:

- Lead free
- Mercury free
- 50% postconsumer recycled content

When developing your performance requirements, you must be specific in what you expect the product to adhere to. These requirements must be obtainable, measurable, and verifiable. Using general language like “Low VOC” is not a measurable or verifiable requirement. A specific attainable level of VOCs should be identified.

In developing these specific requirements, one additional criterion must be addressed, and that is the level of competition available to meet your requirements. Establishing a set of performance requirements that limit your competition among suppliers will undoubtedly raise the cost of such products. Maintaining an equitable number of suppliers while including environmentally friendly performance requirements will enable you to achieve the best results.

## USING EXISTING STANDARDS

The best method of specifying your performance requirements is to identify existing environmentally friendly standards and specify product compliance with these standards. Examples of existing environmentally friendly standards include:

- [Energy Star](#)
- [Green Seal](#)
- [ISO 14000](#)

These standards cover a large percentage of available products on the market today and insure that the products purchased will have the least impact on the environment during product development and throughout their useful lives. For example, [Green Seal](#) conducts a life-cycle evaluation of the product category that evaluates the major environmental impacts in each life-cycle stage including resource extraction, production, distribution, use, and eventual disposal or recycling. The evaluation considers energy, resource use, and emissions to air, water, and land, as well as other environmental and health impacts. The purpose of this evaluation is to identify significant life-cycle stages to be addressed in the standard. The evaluation also ensures that the environmental criteria selected will not lead to the transfer



of impacts from one stage of the life cycle to another or from one medium (air, water, land) to another without a net gain in environmental benefit.<sup>42</sup>

When purchasing products which have yet to be assessed using these environmentally friendly standards, the specifier has a couple of options. They are:

- Life Cycle Cost Assessment
- Best Value Assessment

A word of caution: These two unique product assessment tools require extensive research and involve detailed evaluation methodology development for assessing value of both the products and the companies supplying the products. Individuals wishing to use either one of these product assessment tools should check with their internal Procurement Departments for authorization and assistance in developing such assessment methodologies.

### **LIFE CYCLE COST ASSESSMENT**

A life cycle cost assessment of a product is a true quantitative evaluation of the product's overall cost rather than simply assessing the initial purchase price of the product. The life cycle cost assessment takes into consideration the purchase price, the operational costs, the maintenance costs, and finally the disposal cost of a product. These costs are assessed throughout the product's useful life. An example of developing a life cycle cost assessment on a typical fleet vehicle with an expected life of seven years is as follows:

- Purchase price: \$14,000
- Operational costs (Fuel Usage): \$800/year x 7 years = \$5,600
- Maintenance Cost (Scheduled Service Intervals): \$300/year x 7 years = \$2,100
- Salvage Value (10% of purchase price): \$1,400

Therefore, the total evaluated assessed cost would be:  $\$14,000 + \$5,600 + \$2,100 - \$1,400 = \$20,300$ .

As you can imagine, the various cost factors affecting the initial price, operation and maintenance costs, and salvage value will vary from one product to the next and will even vary from brand to brand. It is imperative that the evaluation criteria used to determine a total life cycle cost of a product be consistently applied to all products being evaluated. Evaluating products based on the total cost over their useful lives will help ensure the purchase of the most economic and energy efficient products available on the market.

### **BEST VALUE ASSESSMENT**

Like life cycle cost, best value assessment looks at other parameters outside of the initial purchase price of the product. However, best value assessment is more of a qualitative assessment rather than a quantitative assessment. Determining the best value of a product requires identifying specific attributes a product offers and assigning a weighted point system to those attributes. Such attributes associated with typical commodities could include:

- Price
- Embodies one or more of these environmental attributes:
  - Less Hazardous

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<sup>42</sup> Green Seal. About Green Seal Web page. Available at <http://www.greenseal.org/AboutGreenSeal.aspx>.



- Conserves Energy
- Recycled Content
- Prevents Waste
- Improves Air Quality
- Low Volatile Organic Compounds (VOC)
- Conserves Water
- End-of-life Management
- Waste/Materials Management
- Material Availability
- Reduces Global Warming
- Responsible Manufacturers

Once all attributes have been identified that best embody the solicited product, a weighting system can be developed that assigns a specific amount of points for each attribute identified. When using percentages, make sure all percentages add up to 100%. Example:

40% = Price  
 10% = Conserves energy  
 10% = Recycled content  
 10% = Improves air quality  
 10% = Conserves water  
 10% = Reduces global warming  
 10% = End-of-life management  
 100% = Total

Now a point system can be applied to all potential suppliers and the supplier with the maximum amount of points will be the supplier providing the Best Value. See table below for a sample evaluation.

#### **Weighting System Example**

Each supplier will be given a rating based on how they compared with the industry as a whole or with other suppliers offering similar products. In this case, a maximum of 10 points was assigned to each attribute. It is imperative that the evaluation criteria used to determine the point ratings of each supplier be consistently applied to all suppliers being evaluated.

Attribute	Rating	Weight	Score
Price	7	40%	2.8
Conserves Energy	4	10%	0.4
Recycled Content	9	10%	0.9
Improves Air Quality	5	10%	0.5
Conserves Water	6	10%	0.6
Reduces Global Warming	8	10%	0.8
End-of-Life Management	10	10%	1.0
Total			7.0

#### **TRACKING PRODUCT PERFORMANCE AND CONTINUALLY IMPROVING**

Consider tracking the total purchase of environmentally preferable products in your workplace. Tracking purchases can help you note what has worked well and where problems have been encountered. Benefits include identifying whether suppliers priced the products competitively, made them readily available, and met your expectations.

To assist you in keeping track, you may wish to use a form similar to the one developed by the Minnesota Department of Administration. A list of codes for environmental products follows.

### **Model Tracking Form**

Buyer's Name		Agency		
Phone No.		Fax No.		
Quarter and Year of Report (by fiscal year)				
<b>Environmentally Responsible Acquisitions</b>				
Order Number or Contract No.	Category Code	Supplier	Product	Dollar Amount
			Total:	

### **Environmental Codes for Tracking Purchases**

Environmental Code		Definition
EE =	Energy Efficient	<b>A product that uses less energy</b> (either electricity or fossil fuel) to accomplish its task relative to a comparable product by the same manufacturer.
LT =	Less Toxic	<b>A product containing a smaller amount of toxic substances</b> relative to a comparable product or a product reformulated to be less toxic.
PB =	Plant-Based	<b>A product derived from renewable resources</b> , including fiber crops (such as kenaf); chemical extracts from oilseeds, nuts, fruits and vegetables (such as corn and soybeans); agricultural residues (such as wheat straw and corn stover); and wood wastes generated from processing and manufacturing operations. These products stand in contrast to those made from fossil fuels (such as petroleum) and other less renewable resources (such as virgin timber).

<b>RB =</b>	<b>Rebuilt</b>	<b>A product refurbished</b> to a level less than a total remanufacture. The warranty is by the rebuilder, and may be different from the same product when new or remanufactured. Also called reconditioned or refurbished.
<b>RC =</b>	<b>Recycled Content</b>	<b>A product containing materials recovered or diverted</b> from the solid waste stream after consumer use ("post-consumer").
<b>RK =</b>	<b>Reduced Packaging</b>	<b>A product presented for use with less packaging</b> or alternative methods of packaging or shipping.
<b>EM =</b>	<b>Remanufactured</b>	<b>A product restored to its original condition</b> by extensive rebuilding, usually given an equal or better warranty than a new product.
<b>RE =</b>	<b>Repair</b>	<b>A product that has had a defect corrected</b> and can again serve its original function. Repairing is a less comprehensive process than either remanufacturing or rebuilding.
<b>US =</b>	<b>Used</b>	<b>A product used or owned before</b> without further maintenance.
<b>WC =</b>	<b>Water Conserving</b>	<b>A product that requires less water</b> to operate or to manufacture than a comparable product, or a different version of the same product from the same manufacturer.
<b>MU =</b>	<b>Multiple Codes</b>	<b>A product that has several significant environmentally responsible characteristics</b> , and could be classified under more than one code, but not one code is predominant
<b>TO =</b>	<b>Other</b>	<b>A product having environmentally responsible characteristics</b> that does not fit into any of the categories listed above.

## Sources

- [Materials Exchange](#)
- [DGS Surplus](#)
- [State Contracts](#)
- [Prison Industry Authority](#)
- [CIWMB Recycled-Content Product Directory and Other Web Resources](#)

## Sources – Materials Exchange

### Environmental and Health Issues



#### Prevents Waste:

Materials exchange diverts usable items and materials from landfills and conserves natural resources.

See the [Introduction](#) for a complete description of this environmental issue.

- [What is a materials exchange program?](#)
- [What is the California Materials Exchange \(CalMAX\)?](#)
- [What are the benefits of using CalMAX?](#)
- [Who is using materials exchange programs?](#)
- [Success Story](#)
- [Other Materials Exchange Programs in California](#)

### WHAT IS A MATERIALS EXCHANGE PROGRAM?

A materials exchange program provides a resource which businesses, citizens, schools, nonprofits, and governmental entities can use to match those who have unwanted materials with others who may want those materials. Materials exchange promotes the reuse and recycling of items and materials that might otherwise be thrown away.

### WHAT IS THE CALIFORNIA MATERIALS EXCHANGE (CAL/MAX)?

CalMAX - the [California Materials Exchange](#) - is a free, online service designed to help find markets for nonhazardous materials that may have been traditionally discarded. The program is used by the public and private sectors.

### WHAT ARE THE BENEFITS OF USING CALMAX?

CalMAX helps conserve energy, resources, and landfill space by assisting businesses and organizations find alternatives to the disposal of valuable materials through exchange. CalMAX helps divert an average of 67,000 tons of materials each year. Examples of materials that are being exchanged include: construction and demolition materials, office and home furniture, pallets, packaging materials, computers, wood, paint, organic matter such as food waste, and plastics.

Businesses can benefit in a number of ways. They can exchange materials with each other, and give material to schools and nonprofits. CalMAX also helps businesses network in their community. Businesses that are active in recycling become notable in the community and are modeled by other businesses and community members.

Schools and nonprofits can also use CalMAX to search online for available and wanted materials. Schools receive items such as gardening material, desks, computers, art materials, and general office items. Community organizations receive furniture and office equipment.

Please visit the [CalMAX Web site](#) for more exchange models and stories.

### **State Agency Waste Diversion**

[California law](#) [Chapter 764, Statutes of 1999 (Strom-Martin, AB 75)] requires each State agency and large State facility to divert 50 percent of their solid waste stream from landfills or transformation facilities through source reduction, recycling, and composting activities. State agencies can obtain source reduction credit for donating materials and items through [materials exchange programs](#) such as CalMAX, fleet sales, auctions, and [State Surplus Property](#). The Department of General Services (DGS), State Surplus Property Reuse Program oversees surplus property; therefore, State agencies need to obtain approval from the DGS prior to donating materials or items through any materials exchange programs. To streamline the approval process, the DGS now offers an Internet-based customer interface, where State agencies can electronically complete and submit Property Survey Reports and Transfer of Location Reports for approval.

### **WHO IS USING MATERIALS EXCHANGE PROGRAMS?**

CalMAX was originally established to help cities and counties meet mandated waste diversion goals. CalMAX, and other materials exchange programs, are used by State and local governments throughout California as well as private citizens, businesses, schools, and nonprofit groups.

### **SUCCESS STORY**

#### **A CalMAX Business Model**

A window manufacturer in northern California-specializing in wood windows and door restoration-produced large amounts of sawdust as a by-product of the manufacturing process. The window maker placed an advertisement for the available sawdust at the CalMAX Web site. A horse rancher in a nearby county found the sawdust ad and contacted the window maker. The rancher needed the sawdust for use in the horses' stalls as bedding. They made arrangements for pickup and now the rancher collects sawdust from the window maker on an on-going basis. The benefits of this, as in other arrangements, include avoided costs - in this case, the avoided disposal costs of the sawdust to the window maker and the avoided (or reduced) cost of horse bedding material for the rancher. After use in the stalls, the material is mixed with compost and has a third life in the garden.

### **OTHER MATERIALS EXCHANGE PROGRAMS IN CALIFORNIA**

#### **[Los Angeles County Materials Exchange Program \(LACoMAX\)](#)**

LACoMAX is a free service designed to help residents, businesses, institutions, and organizations in Los Angeles County find markets for their industrial by-products, surplus materials, and other discards. LACoMAX encourages individuals, businesses, schools, and nonprofit organizations in the County of Los Angeles to post their available materials and to find needed materials over the Web.

Contact:

Los Angeles County Department of Public Works  
Environmental Programs Division  
900 S. Fremont Avenue, 3rd Floor Annex

Alhambra, CA 91803-1331  
(626) 458-6974; (626) 458-3593 (Fax)

### **MarinMAX Materials Exchange**

MarinMax is a program developed to provide a reuse service for residents, businesses, nonprofit organizations, and schools located in Marin County. This free on-line resource allows members of the community to search for used items they need or give away items they have no use for or might otherwise dispose of.

Contact:  
Marin County Department of Public Works  
Waste Management Division  
P.O. Box 4186  
San Rafael, CA 94913-4186  
(415) 499-6647; (415) 446-7373 (Fax)  
E-mail: <mailto:info@marinmax.org>

### **Napa County Materials Exchange Program (NapaMax)**

NapaMax is a division of the City of Napa assigned the responsibility of coordinating the reduction of waste materials being disposed of in area landfills. They encourage and support any efforts to recycle and reuse materials. NapaMax is a free on-line resource enabling users to gain needed materials or to discard any unnecessary or unwanted materials. Its purpose is to conserve energy, resources and landfill space by providing you with an easy alternative. This alternative involves simply logging in to the NapaMax Web site and creating a wanted or available listing.

Contact:  
City of Napa  
Public Works Department  
Waste Reduction and Recycling Coordinator  
P.O. Box 660  
Napa, CA 94559-0660  
(707) 257-9520 ext.7291; (707) 257-9522 (Fax)

### **Santa Cruz County Materials Exchange Program (ProMAX):**

ProMAX is sponsored by the County of Santa Cruz and managed by Ecology Action, a nonprofit organization of Santa Cruz. This is one of Ecology Action's innovative waste reduction programs for the Monterey Bay area. Ecology Action actively seeks matches between entities that have materials available or are searching for materials.

Contact:  
Ecology Action  
P.O. Box 1188  
Santa Cruz, CA 95061-1188  
(831) 426-5925 ext. 28  
E-mail: [mailto:vaguiar@ecoact.org](mailto:mailto:vaguiar@ecoact.org)

### **Sonoma County Materials Exchange Program (SonoMAX)**

SonoMax is a free service designed to match the discards of businesses and other entities in Sonoma County with potential users. Any business, nonprofit group, or government agency can list materials they

have available or would like to acquire. The program is operated through the County's Eco-Desk Hotline. SonoMAX listings are published quarterly. Listings are updated regularly on the Web site.

**Contact:**

Sonoma County Waste Management Agency  
2300 County Center Drive, Ste. B-100  
Santa Rosa, CA 95403  
(707) 565-3668  
Eco-Desk Hotline (707) 565-desk (3375)  
E-mail: <mailto:refkarina@sonoma-county.org>

**Ventura County Materials Exchange Program (VCMAX)**

VCMAX publishes listings on a quarterly basis, and provides on-line listing services. VCMAX is a free service designed to reduce the amount of resources buried in local landfills. The discards of one business or nonprofit organization can be diverted to provide feedstock for another local business, school, government agency, or nonprofit organization. (No brokers, please.) This quarterly publication and newsletter also serves as a resource guide featuring waste reduction information and events.

**Contact:**

Ventura County Environmental and Energy Resources Department  
1000 Hill Road, Suite 100  
Ventura, CA 93003  
(805) 289-3120; (805) 289-3102 (Fax)  
E-mail: <mailto:pandee.leachman@mail.co.ventura.ca.us>

**Special Note:** Portions of the Environmentally Preferable Purchasing Best Practices Manual were borrowed or adapted from the [Environmentally Preferable Purchasing Guide](#) published by the Solid Waste Management Coordinating Board of Minnesota.

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## Sources – State of California Surplus Property Reuse Program

### Environmental and Health Issues



**Prevents Waste:**

Reusing state property diverts usable items and materials from landfills and conserves natural resources. See the [Introduction](#) for a complete description of this environmental issue.

- [Program Overview](#)
- [State Agency Waste Diversion](#)
- [State Agency Buy Recycled Campaign](#)

### PROGRAM OVERVIEW

The [State Administrative Manual, Section 3520](#) establishes the guidelines for an agency's disposition of State-owned surplus property (in Section 3520, see note on exceptions for the disposition of vehicles and

mobile equipment). Prior to a State agency's disposal or transfer of any State-owned surplus property, the agency must obtain approval from the Surplus Property Section of the Interagency Services Division of the Department of General Services (DGS). The Surplus Property Reuse Program's staffs of property reuse professionals will provide appropriate guidance as to which action is most beneficial to the state agency. Because the program provides the necessary warehouse space and expertise in making surplus property available to other state and local government agencies, non-profit organizations and the general public, virtually all of this property is reused. Items that are of no further use are disposed of through contracts with recyclers.

To streamline the approval process, the DGS offers the California Surplus Property System, which is an Internet-based customer interface where State agencies can electronically complete and submit Property Survey Reports and Transfer of Location Reports for approval

Visit the DGS' Web site for detailed information, including contact information, for the Surplus Property Reuse Program.

## **STATE AGENCY WASTE DIVERSION**

[California law \[Chapter 764, Statutes of 1999 \(Strom-Martin, AB 75\)\]](#) requires each State agency and large State facility to divert 50 percent of their solid waste stream from landfills or transformation facilities through source reduction, recycling, and composting activities. State agencies can obtain [source reduction credit](#) for donating items through the Surplus Property Reuse Program.

## **STATE AGENCY BUY RECYCLED CAMPAIGN (SABRC)**

Public Contract Code (PCC) section 12203 requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on products within 11 product categories be spent on recycled-content products (RCP). In addition, PCC section 12211 requires RCP and non-RCP purchases to be reported in each agency's annual SABRC Procurement Report. Reused products are considered to be RCPs (see PCC section 12200); therefore, items purchased through the Surplus Property Reuse Program can be counted as RCPs under the SABRC. [1]

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[1] California Integrated Waste Management Board. State Agency Buy Recycled Campaign Training Manual for Fiscal Year 2003-2004, page 4. Available at <http://www.calrecycle.ca.gov/publications/BuyRecycled/43303014.pdf>. Accessed on December 29, 2005.

## **Sources – State Contracts**

- [LOCAL AGENCY USE OF STATE CONTRACTS](#)
- [PRODUCTS AVAILABLE WITH ENVIRONMENTAL ATTRIBUTES: STATE CONTRACTS AND PRISON INDUSTRY AUTHORITY](#)

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## **Prison Industry Authority**

### **Environmental and Health Issues and Recommendations**





#### **Responsible Manufacturers:**

- The Prison Industry Authority (PIA) strives to operate all of its manufacturing, service, and agricultural enterprises in a responsible, green manner. PIA's efforts help to conserve resources, reduce waste, control global warming, and prevent pollution. [PIA products](#) and services can be purchased by governmental entities.
- By providing inmates with real world work experience, PIA helps to prepare them for successful re-entry into [society](#). In this sense, PIA is the ultimate recycler. PIA provides inmates with the training and experience necessary to recycle these inmates from their prior lives into productive citizens.



#### **Recycled Content:**

Many PIA products are produced with recycled content.

[Recycled-content certification](#) for all PIA products is available through [PIA's Web site](#).



#### **Prevents Waste:**

Some PIA enterprises refurbish or remanufacture obsolete PIA products, such as remanufactured office panel systems and refurbished institutional mattresses.



#### **Less Hazardous:**

PIA uses less hazardous raw materials in the production of finished products (such as office furniture) and this reduces human exposure to these substances in both the production process and product use.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [What is the Prison Industry Authority?](#)
- [Environmentally Preferable Manufacturing and Finished Products](#)
- [What types of products are available from PIA?](#)
- [Enabling Legislation](#)
- [Who may purchase from PIA?](#)
- [What are the benefits of purchasing from PIA?](#)
- [Where can I get recycled-content certification for PIA products?](#)
- [How can I purchase from PIA?](#)
- [How do I contact PIA?](#)
- [Success Stories](#)
- [Resources](#)

## WHAT IS THE PRISON INDUSTRY AUTHORITY?

[The Prison Industry Authority](#) (PIA) is a California state agency under the [Department of Corrections and Rehabilitation](#). The primary function of PIA is to rehabilitate inmates and facilitate their successful re-entry into society.

PIA provides work assignments for approximately 6,000 inmates and operates over more than 60 service, manufacturing, and agricultural industries at 22 prisons throughout California. The organization is self-supporting and does not receive an annual appropriation from the Legislature. PIA's revenue comes from the sale of its products and services.

[PIA benefits](#) society in many ways

## ENVIRONMENTALLY PREFERABLE MANUFACTURING AND FINISHED PRODUCTS

PIA has more than 60 enterprises, so the methods used to improve environmental performance vary depending on the nature of each individual enterprise. Practices may include using less hazardous raw materials in the production of finished products, manufacturing processes and finished products which conserve energy, production techniques that prevent waste, contributing to clean air by operating within all applicable air quality requirements, developing green office furniture products that have low volatile organic compounds (VOC), conserving water in the production process, as well as using end-of-life management processes for some products. These efforts help to conserve resources, reduce waste, control global warming, and prevent pollution.

## WHAT TYPES OF PRODUCTS ARE AVAILABLE FROM PIA?

PIA provides a wide range of products and services. In some cases, products are produced for a specific customer and are not available for general sales, e.g., license plates sales are restricted to the Department of Motor Vehicles. Listed below are the major categories:

- Bakery " Bindery Products
- Boots and Shoes
- Cabinets and Wardrobes
- Century Systems Modular Office Furniture
- Cleaning Products
- Coffee Roasting
- Dairies and Farms
- Dental Lab Services
- Detention and Institutional Metal Products
- Digital Services
- Egg Processing
- Files and Vertical Shelf Files
- Flags
- Food Packaging
- Freestanding Screens
- Gloves
- Gun Clearing Tube/Bullet Traps
- Industrial Metal Shelving
- Laundry Services
- Library Furniture
- License Plates
- Mattresses and Mattress Refurbishing
- Meat Cutting
- Metal and Mesh Signs
- Metal Lockers
- Miscellaneous Fabric Products
- Nomex® Firefighter Clothing
- Office Furniture
- Optical Products
- Pillows
- Poultry Processing
- Printing Services
- Residential Furniture
- Residential Loft Systems
- Seating
- Silk Screen Decals
- Stainless Steel Food Equipment
- Wardrobe Cabinets
- Women's and Men's Clothing

## ENABLING LEGISLATION

Enabling legislation for the PIA is found in [Penal Code \(PC\) section 2800](#), et seq.

## WHO MAY PURCHASE FROM PIA?

[California PC section 2807](#) authorizes PIA to provide products and services needed by the State, or any political subdivision thereof, or by the federal government, or any department, agency, or corporation thereof, or for any other public use. In essence, PIA may sell to governmental entities. This includes, federal, state, county, city, special districts, or political subdivisions. In addition, products may be purchased by state agencies to be offered for sale to inmates of the Department of Corrections and Rehabilitation, and any other persons under the care of the state who reside in state-operated institutional facilities. Fresh meat may be purchased by food service operations in state-owned facilities and sold for on-site consumption.

[California PC section 2807\(b\)](#) mandates that all things produced by PIA shall be purchased by the State or any agency thereof. It further requires that state agencies make maximum utilization of such products and consult with PIA to develop new products and adapt existing products to meet their needs. State agencies may be granted waivers by the PIA to procure products from other sources when justified. PIA's waiver process for state agencies to follow has been revised as of June 1, 2004 and is available on-line.

[California PC section 2814](#) authorizes PIA to sell products and byproducts of agricultural and animal husbandry enterprises, except nursery stock, to private persons, at public or private sale.

[California PC section 2815](#) authorizes PIA to sell to foreign governments, corporations for distribution in foreign countries, and private persons or their agents in markets outside the United States and in countries which permit the importation of prison-made goods.

## WHAT ARE THE BENEFITS OF PURCHASING FROM PIA?

While PIA strives to produce a variety of environmentally preferable products and services, PIA's primary purpose is to improve public safety. By providing inmates with real world work experience, PIA helps to prepare them for successful re-entry into society. In this sense, PIA is the ultimate recycler. PIA provides inmates with the training and experience necessary to recycle these inmates from their prior life into productive citizens.

PIA provides inmates with job opportunities which have been shown to reduce prison idleness and violence by offering inmates training and career enhancing job skills. PIA's job assignments are voluntary- inmates are not required to work; however, inmates are generally eager to participate, as waiting lists are common for many PIA assignments.

Listed below are some of the specific benefits:

- PIA programs assist inmates in learning how to work. Many PIA inmate workers have never held a job or learned the value of work. PIA staff train inmates to behave appropriately in the job environment, do quality work, report to work on time, and follow all federal and state health, safety, and occupational regulations.
- PIA inmate work assignments provide productive activity, thereby reducing idleness and prison violence. In 1998, the Department of Corrections completed an internal study which found that inmates assigned to PIA had a lower rate of reported serious incidents than inmates with other assignments.

- PIA helps to reduce recidivism. This reduction of recidivism reduces prison costs and contributes to public safety.
- Up to 40 percent of an inmate's wages may be deducted for court-ordered restitution/fines and is transferred to the Crime Victims' Restitution Fund. In fiscal year 2003-04, over more than \$500,000 of PIA inmates' earnings were deposited. Since fiscal year 1992-93, \$5.2 million have been deposited in the Crime Victims' Restitution Fund.
- A study in 2002 by the University of California, Berkeley calculated PIA's contribution to California's economy. The study found that through its production and sales as well as the purchase of supplies from the private sector, PIA has a positive effect on the State's economy. PIA's impact consequently produced an increase in jobs and sales in California's private sector.[\[1\]](#)
- PIA further enhances the ability of inmates to obtain private sector jobs upon release through its Inmate Employability Program. This program documents inmate skills, experience, and positive work habits while assigned to PIA's enterprises. Inmates are also encouraged to participate in a variety of training programs which can lead to formal job skill recognition through industry-accredited certification programs.

Whether we want to think about it or not, most inmates return to society and are likely to commit new crimes. PIA works to prepare inmates to "hit the street" ready to obtain employment; therefore being less likely to re-offend. PIA is more than a program that provides work skills and job training - it is an investment in public safety.

#### **WHERE CAN I GET RECYCLED-CONTENT CERTIFICATION FOR PIA PRODUCTS?**

PIA provides recycled-content certification from its Web site. Customers may access the recycled-content certification from the right side of the [home page](#) or throughout the [electronic catalog](#) on each product page. If a product's recycled content is not included in the database, customers may contact Customer Services at (916) 358-2733.

#### **HOW CAN I PURCHASE FROM PIA?**

Customers may purchase from PIA by mailing or faxing a purchase order to PIA, by ordering through the [electronic catalog](#), or by phoning in a credit card order.

To purchase with a purchase order, mail your agency's purchase order to:

Prison Industry Authority  
Attn: Customer Service  
560 East Natoma Street  
Folsom, CA 95630-2200

Purchase orders may also be faxed to PIA at (916) 358-2660. Please do not fax orders or any documents which include credit card information.

All purchase orders must include the following:

- ship-to and bill-to addresses
- authorized signature to encumber funds, or credit card authorization
- agency funding source: fund, agency, fiscal year, reference (State agencies only)

- agency contact person and public telephone number including area code
- bid number, if applicable
- complete 12-digit style number
- specific colors, finishes and options

Customers may visit PIA's [electronic catalog](#). After completing your shopping, you may pay for electronic catalog orders through an online version of an agency purchase order or by using an agency credit card.

Credit card orders may only be submitted through the electronic catalog or as a telephone order. To submit a credit card phone order, please call (916) 358-2751.

## HOW DO I CONTACT PIA?

**Email:** [info@pia.ca.gov](mailto:info@pia.ca.gov)

**Phone:** Customer Services (916) 358-2727, Sales Manager (916) 358-2753

**Web site:** [PIA's electronic catalog](#)

## SUCCESS STORIES

Listed below are just a few of PIA's environmental successes:

- PIA's Century Systems modular office furniture meets all of California's extremely stringent green standards as well as receiving Greenguard's environmental certification. In 2003, the East End Project in Sacramento won a Governor's Environmental and Economic Leadership Award in recognition of its status as a green building. PIA's Century Systems furniture was featured throughout much of the East End Project.
- PIA actively works to use recycled raw materials whenever possible. For example, all steel products use 70 percent recycled metal; recycled aluminum is used to produce license plates and metal signs;; recycled paper is available in print operations;; and recycled fabrics are available on seating and upholstered products.
- PIA laundries are designed to conserve water wherever possible. This is particularly important because many prisons are located in remote locations with limited water supplies. The reduced use of water reduces waste water and helps ensure the availability of fresh water for other uses.
- PIA recycles cotton core mattresses for all Department of Corrections and Rehabilitation institutions. This process provides sanitized, remanufactured mattresses at a lower price while reducing the burden on California's landfills.
- PIA works to protect ground water around its dairy operations. In addition, PIA is currently investigating the feasibility of creating a co-generation facility run from the methane gas byproduct.

## RESOURCES

- [PIA's Web Site](#)
- [PIA Terms and Conditions](#)

[1] George Goldman, Ph.D. and Vijay Pradhan, Ph.D., The Economic Impact of California's Prison Industries, University of California Cooperative Extension, University of California, Berkeley, 2002.

## Sources – California Integrated Waste Management Board Recycled — Content Product Directory and Other Web Resources

### Environmental, Health, and Economic Issues



#### Recycled Content:

Buying products made with material that has been diverted from landfills benefits our environment and the economy. Recyclable materials are used natural resources and need to be effectively used again to avoid impacts on the planet such as those resulting from road building for the harvesting of virgin forests, wildlife habitat loss, stream erosion; ocean, air, and water pollution; mineral extraction, petroleum extraction, energy use, etc. Furthermore, recycling creates jobs. From collection of recyclable materials to the manufacture of a finished product, more people are employed in this process than if the same materials were buried in a landfill. Diversion creates twice as many jobs, double the income, and twice the sales per ton of material than does disposal. [1]

- Look for products that contain postconsumer material, which is finished material that has completed its life cycle as a consumer item, and that would have been disposed of as a solid waste, but is instead diverted from landfill disposal and recycled or reused in some other manner. Purchasing recycled-content products that are made with postconsumer material directly supports the recycling programs of local jurisdictions.

See the [Introduction](#) for a complete description of this environmental issue.

- [What is the Recycled-Content Product Directory?](#)
- [How can I search the Directory?](#)
- [How can I list my company and products in the Directory?](#)
- [Recycled Content](#)
- [What types of products are available?](#)
- [Vendors](#)
- [Laws and Guidelines](#)
- [Resources and Web Sites](#)

### WHAT IS THE RECYCLED-CONTENT PRODUCT DIRECTORY?

The California Integrated Waste Management Board (CIWMB) [Recycled-Content Product Directory](#) (RCPD) was created to inform buyers about available recycled-content products (RCP). The RCPD provides a free Web site for manufacturers, retailers, wholesalers and other distributors to advertise their RCPs, while allowing buyers and consumers to search for RCPs. Remember, recycling only works if recycled materials become feedstock to manufacture new products, and those new RCPs are purchased. Purchasing RCPs is the critical fourth arrow in the recycling loop, the last step of effectively managing solid waste, and makes the recycling process work.

The RCPD is essentially a marketing tool for those who sell RCPs.

## HOW CAN I SEARCH THE DIRECTORY?

Anyone who has access to the internet can search the RCPD by product, business name, or key word.

## HOW CAN I LIST MY COMPANY AND PRODUCTS IN THE DIRECTORY?

The RCPD offers a self-listing menu feature called [Add/Edit Company Info](#) whereby companies can access the directory to list their company and products. Once the CIWMB's directory coordinator reviews the information for appropriateness, completes any necessary edits, and final edits are agreed upon, the company and its products will be listed. Once a company is listed, it is expected to periodically review (at least annually) and update its listings for accuracy and completeness. Companies are encouraged to provide sufficient detail in their company and product profiles.

Recycled content percentages can be given in ranges as content may vary during different manufacturing production runs. Providing accurate information is the utmost concern. Companies listing on the RCPD are expected to follow the Federal Trade Commission's [Part 260 -- Guides for the Use of Environmental Marketing Claims](#).

Companies are encouraged to contact RCPD staff for information on the documentation that is needed to have products listed as [State Agency Buy Recycled Campaign-compliant](#) in the RCPD.

There is no fee for listing a product on the RCPD. The only requirement is to provide accurate product information, and review and update your listing at least annually. This is free advertising.

## RECYCLED CONTENT

Products listed on the RCPD must contain some recycled material. [Postconsumer](#) recycled content materials are most preferred, because diverting these materials from landfills and using them to produce new products makes local recycling programs work. [Secondary material](#), also known as post-industrial or pre-consumer material, is acceptable also.

The higher the postconsumer content, the more used resources are being diverted from landfills, thus preventing pollution, employing more people, and conserving energy, resources and landfill space. Recycled content is a high priority environmental attribute to consider during procurement.

## WHAT TYPES OF PRODUCTS ARE AVAILABLE?

There are a myriad of products with recycled content on the market. Many have had recycled content for years, but are not necessarily advertised as such. Steel, other metals, glass, newspaper, oil, cardboard, etc., are examples. The RCPs of today include writing, printing and janitorial papers; compost products; various plastic products (lumber, bins, bags, auto parts, etc.); lubricating oil; various glass products; home and building products (including paint, ceiling tiles, carpet); printer toner cartridges (re-manufactured); certain textiles and clothing; tire-derived products (such as rubberized asphalt, mats, ramps, sidewalks, etc.); retreaded tires; and the list goes on and on. Most RCPs meet, or may exceed, original equipment manufacturers' (O.E.M.) specifications.

## VENDORS

This directory contains, and welcomes, companies (those that sell RCPs) based in the United States and internationally. Currently, over 2,650 companies and approximately 6,315 products are listed, and



companies and products are added on a regular basis. Small businesses are strongly encouraged to submit listings to the RCPD. California small businesses are encouraged to include their California small business certification number -- issued by the [California Department of General Services](#) . Also, companies in other states, where certification numbers might be used, are encouraged to list those numbers in the company detail portion of their company listings. Companies of all sizes are invited to list.

## **LAWS AND GUIDELINES**

### **California**

#### ***Law***

- State law [\[Public Resources Code section 42600\(d\)\]](#) directs the CIWMB to maintain a directory of RCP vendors.
- The RCPD also contains a [section](#) for California's [State Agency Buy Recycled Campaign](#) (SABRC). The SABRC is a joint effort between the California Integrated Waste Management Board (CIWMB) and the Department of General Services (DGS) to implement State law [\[Public Contract Code \(PCC\) section 12153 et seq.\]](#) requiring State agencies to purchase products with recycled content. The law ([PCC section 12205](#)) also requires State agencies to obtain recycled-content certification. If a product in the RCPD is listed as being SABRC-compliant, then State purchasers do not need to obtain separate recycled-content certification for that product.
  - Companies are encouraged to contact [RCPD staff](#) for information on the documentation that is needed to have products listed as SABRC-compliant in the RCPD.
- California law ([PCC sections 22150-22154](#)), also requires local public entities to purchase RCPs and obtain recycled-content certification.

#### ***Policies***

**State of California, Purchasing Authority Manual.** [Chapter 3](#) contains environmental policies. The State Agency Buy Recycled Campaign is explained under Topic 8.

**State of California, State Administrative Manual.** Waste prevention and recycling policies are described in [Chapter 1900](#).

#### **Federal**

Federal Executive Order 13101 outlines the Federal government's commitment to recycling and buying recycled-content and other environmentally preferable products.

## **RESOURCES AND WEB SITES**

The following Web sites provide information that will assist you with your solid waste management and environmentally preferable purchasing programs.

### **[California Integrated Waste Management Board \(CIWMB\)](#)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

### **[Business Waste Reduction Resource \(BizWaste\)](#)**

(916) 341-6363



This resource provides answers and resources for the most common business waste issues. This site also contains fact sheets and case studies , information about office paper reduction, and the famous CIWMB waste reduction and recycling posters and signs.

[The Buy Recycled Programs Home page](#) is a gateway to the CIWMB's buys recycled activities.

The [Buy Recycled Resources pages](#) provide audience- and product-specific resources and links to databases and directories.

#### **[California Materials Exchange \(CalMAX\)](#)**

(916) 341-6199

CalMAX is a free service that conserves energy, resources, and landfill space by helping businesses and organizations find alternatives to the disposal of valuable materials or wastes through waste exchange. CalMAX helps businesses find markets for nonhazardous materials they have traditionally discarded, and helps businesses, industries, and institutions save resources and money.

#### **[Environmentally Preferable Purchasing \(EPP\)](#)**

These web pages provide a wide array of information to help public and private entities implement and further develop their EPP practices. Topics covered include EPP laws and sample procurement policies, the State's EPP Task Force, the California Green Lodging Program, tools and resources, news and events, links to other EPP resources, a glossary, recycled-content products, and contacts.

#### **[Waste Prevention Information Exchange \(WPIE\)](#)**

(916) 341-6363

The most extensive directory of in-depth waste prevention information. The WPIE contains hundreds of documents and links. Staff can also conduct limited research for information that is not in the directory.

#### **[Waste Reduction Awards Program \(WRAP\)](#)**

(916) 341-6268

WRAP provides an opportunity for California businesses to gain public recognition for their outstanding efforts to reduce waste. Winners receive a certificate and the use of the WRAP logo on products, advertisements and promotional materials.

#### **[Minnesota, Solid Waste Management Coordinating Board of \(SWMCB\)](#)**

The SWMCB's [Environmentally Preferable Purchasing Guide](#) is a comprehensive reference tool for government and school purchasers.

#### **[Pennsylvania Department of Environmental Protection](#)**

Harrisburg, PA

(717) 787-9580

Pennsylvania's Recycled Products Guide is a searchable database of recycled products.

#### **[Prison Industry Authority, State of California \(PIA\)](#)**

The PIA produces recycled-content and other environmentally preferable products and provides recycled-content certification for its products in its [on-line catalog](#).

#### **[Recycled Products Guide for the United Kingdom](#)**

The Recycled Products Guide for the United Kingdom Web site is hosted by the Waste and Resources Action Programme, which was established in 2001 by the government to promote sustainable waste management and create stable and efficient markets for recycled materials and products.

**United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

List of [Buy/Manufacture Recycled Publications](#).

Visit the [Comprehensive Procurement Guidelines \(CPG\) Web site](#) for Recovered Materials Advisory Notices (RMAN), which recommend recycled-content levels. The site includes a CPG Supplier Database. The USEPA also maintains a [Database of Environmental Information for Products and Services](#).

[WasteWise](#) is a free, voluntary program helping U.S. organizations eliminate costly municipal solid waste, benefiting the bottom line and the environment. Among other things, WasteWise partners commit to increasing overall recycled content in the products they purchase, either by purchasing recycled products in lieu of virgin products or by increasing the recycled content in those recycled products they already buy. Manufacturers have the additional option to increase the percentage of postconsumer content in the products they produce.<sup>[2]</sup>

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[1] Based upon the following studies:

George Goldman and Aya Ogishi, Department of Agricultural and Resource Economics, University of California, Berkeley . *The Economic Impact of Waste Disposal and Diversion in California* (April 4, 2001). Available at

[www.ciwmb.ca.gov/Agendas/MtgDocs/2002/01/00007123.pdf](http://www.ciwmb.ca.gov/Agendas/MtgDocs/2002/01/00007123.pdf).

California Recycling Economic Information Study (July 2001). Prepared by The National Recycling Coalition in association with R. W. Beck, Inc. Available at

[www.ciwmb.ca.gov/Agendas/MtgDocs/2002/01/00007124.pdf](http://www.ciwmb.ca.gov/Agendas/MtgDocs/2002/01/00007124.pdf).

See also California Integrated Waste Management Board Recycling Market Development Zones Online Resources Web page. Available at <http://www.calrecycle.ca.gov/RMDZ/Resources/#EconStudies>.

[2] United States Environmental Protection Agency. WasteWise Buy/Manufacture Recycled Web page. Available at <http://www.epa.gov/epaoswer/non-hw/reduce/wstewise/wrr/buyman.htm>.

## Batteries

### Environmental and Health Issues and Recommendations



#### **Prevents Waste:**

Batteries contain heavy metals such as mercury, lead, cadmium, and nickel, which can contaminate the environment when batteries are improperly disposed of.

- Consider buying rechargeable batteries. Over its useful life, each rechargeable battery may substitute for hundreds of single-use batteries.



#### **End-of-Life Management:**

All batteries are considered hazardous waste in California when they are discarded.

- Manage batteries responsibly by taking advantage of recycling programs.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)
- [End-of-Life Management](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

### Background

According to the United States Environmental Protection Agency,

- "Americans purchase nearly three billion dry-cell batteries every year to power radios, toys, cellular phones, watches, laptop computers, and portable power tools.
- Inside a battery, heavy metals react with chemical electrolyte to produce the battery's power.
- Wet-cell batteries, which contain a liquid electrolyte, commonly power automobiles, boats, or motorcycles.
- Nearly 99 million wet-cell lead-acid car batteries are manufactured each year.
- Mercury was phased out of certain types of batteries in conjunction with the "Mercury-Containing and Rechargeable Battery Management Act," passed in 1996.
- Recycling batteries keeps heavy metals out of landfills and the air. Recycling saves resources because recovered plastic and metals can be used to make new batteries." [\[1\]](#)

### Environmental and Health Issues

According to the United States Environmental Protection Agency,

"Batteries contain heavy metals such as mercury, lead, cadmium, and nickel, which can contaminate the environment when batteries are improperly disposed of. When incinerated, certain metals might be released into the air or can concentrate in the ash produced by the combustion process.

"One way to reduce the number of batteries in the waste stream is to purchase rechargeable batteries. Nearly one in five dry-cell batteries purchased in the United States is rechargeable. Over its useful life, each rechargeable battery may substitute for hundreds of single-use batteries." [\[2\]](#)

## LAWS AND GUIDELINES

See [End-of-Life Management](#).

## PERFORMANCE

The general properties and performance of a variety of batteries are described in the National Law Enforcement and Corrections Technology Center's [New Technology Batteries Guide](#) (see Chapters 2 and 3).

## AVAILABILITY

For information on availability, visit the California Integrated Waste Management Board's Waste Prevention World [Rechargeable Battery and Charger Sources](#) Web page. See also [Vendors](#).

## COST

Rechargeable batteries can offer waste reduction and overall dollar savings in exchange for higher initial cost. [\[3\]](#)

## SPECIFICATIONS

### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

### EcoLoGo<sup>M</sup> Program

The [EcoLoGo<sup>M</sup> Program](#), launched by the Canadian federal government in 1988 provides a market incentive to manufacturers and suppliers of environmentally preferable products and services, and thereby helps consumers identify products and services that are less harmful to the environment.

The [EcoLoGo's Certification Criteria](#) for rechargeable consumer batteries include:

- The rated capacity of the rechargeable consumer battery, by model, must be equal to or greater than the following minimum value: AAA: 300 mAh; AA: 750 mAh; C: 1800 mAh; D: 3000 mAh; N: 270 mAh; and 9V: 180 mAh.
- The cycle life capacity of the battery, by model, must be equal to or greater than the following minimum values: AAA: 7 Ah; AA: 16.5 Ah; C: 48 Ah; D: 70 Ah; N: 5 Ah; and 9V: 3 Ah.
- No electrolyte, sealing compound, or other internal component may appear on any external surfaces of the battery during or following any of the tests specified in the above requirements.
- The battery must be labeled as required in the International Electrotechnical Commission Standard applicable to the model, when available or with at least the following information: safety-related prohibitions; use-related instructions to prevent hazards, promote maximum battery life, and utility.
- The batteries must be manufactured so that none of the effluents or wastes discharged to the environment in the manufacturing process are acutely lethal.
- The batteries must not be manufactured or formulated with mercury, cadmium, or their compounds, except where such substances are present as naturally occurring trace contaminants associated with other battery components. [\[4\]](#)

### Nordic Swan

The Swan is the official Nordic ecolabel, introduced by the Nordic Council of Ministers. The Swan logo demonstrates that a product is a good environmental choice. The green symbol is available for around 60 product groups for which it is felt that ecolabelling is needed and will be beneficial. The Swan checks that products fulfill certain criteria using methods such as samples from independent laboratories, certificates and control visits. The label is usually valid for three years, after which the criteria are revised and the company must reapply for a license.

- Ecolabelling of Primary Batteries. Version 3.1, 17 December 2002 - 14 September 2007
- Ecolabelling of Rechargeable Batteries and Battery Chargers. Version 3.2, 17 December 2002 - 14 September 2007

## VENDORS

### Statewide Office Supplies Contract

Rechargeable batteries and chargers are available through the statewide office supplies contract with OfficeMax (Contract # 1-01-75-55).

[Local agencies may use State procurement contracts.](#)

### Other Contracts

To determine the availability of batteries through other contracts, visit the Department of General Services, [Procurement Division Web site](#).

## SUCCESS STORIES

### Florida

"Broward County, Florida created a pollution prevention program to divert almost one ton of mercury per year in medical batteries from waste disposal facilities. The program involved educating hospital personnel and encouraging the use of less hazardous batteries. Many hospitals actually saved money by switching to the higher cost zinc air batteries because they avoided the cost of having to manage mercury waste." [\[5\]](#),[\[6\]](#)

## RESOURCES AND WEBSITES

### [Australian Government Department of Defence](#)

This department maintains a Battery Safety web site.

### [Battery Council International](#) (BCI)

Chicago, IL

(312) 644-6610

Battery Council International is a trade organization that brings together the leading lead-acid battery manufacturers in North America and other major players from around the world. Externally, BCI provides information and resources on the industry to numerous outside organizations and researchers.

### [California Integrated Waste Management Board](#) (CIWMB)

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the following CIWMB Web sites:

- [Waste Prevention Information Exchange, Batteries](#)
- [Waste Prevention World, Rechargeable Batteries and Chargers](#)

### [Department of Toxic Substances Control](#) (DTSC)

The Department's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. More than 1,000 scientists, engineers and specialized support staff work in [nine locations](#) statewide. See the fact sheet titled "[Management of Spent Lead-Acid Batteries](#)" and the [Universal Waste](#) Web site.

#### **Environment Canada**

##### **The Environmental Choice<sup>M</sup> Program (ECP)**

c/o TerraChoice Environmental Marketing  
Ottawa, Ontario  
Canada

The Environmental Choice<sup>M</sup> Program (ECP), Environment Canada's ecolabelling program, provides a market incentive to manufacturers and suppliers of environmentally preferable products and services, and thereby helps consumers identify products and services that are less harmful to the environment. Established in 1988, the ECP was the second national ecolabelling initiative undertaken. There are now more than three dozen such programs worldwide. The [Global Ecolabelling Network \(GEN\)](#) is an international association of ecolabelling programs, including the ECP.

The Program's official symbol of certification - the EcoLogo<sup>M</sup> - features three stylized doves intertwined to form a maple leaf, representing consumers, industry and government working together to improve Canada's environment. A key aspect of the certification process is the requirement for third party verification of compliance to ECP certification criteria as a condition for certification and licensing.

#### **National Law Enforcement and Corrections Technology Center (NLECTC)**

(800) 248-2742

The NLECTC was created in 1994 as a component of the National Institute of Justice's Office of Science and Technology. See its New Technology Batteries Guide.

#### **United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

The mission of the USEPA is to protect human health and the environment. Since 1970, the USEPA has been working for a cleaner, healthier environment for the American people. See the following on-line resources:

- [Mercury-Containing and Rechargeable Battery Management Act \(Battery Act\) Enforcement Policy and Guidance](#)
- Municipal Solid Waste -- Commodities: Batteries
- [Municipal Solid Waste in the United States, Facts and Figures](#)
- [Product Stewardship, Batteries](#)
- Software for Environmental Awareness, Household Waste Management, Estimated Consumer Battery Sales in 1992 (Purdue University)
- [RCRA Online, documents relating to Batteries](#)

#### **Rechargeable Battery Recycling Corporation (RBRC)**

Atlanta, GA  
(678) 419-9990

The RBRC is a non-profit public service organization dedicated to recycling Nickel Cadmium (Ni-Cd), Nickel Metal Hydride (Ni-MH), Lithium Ion (Li-ion), and Small Sealed Lead \*(Pb) rechargeable batteries. These batteries power a variety of portable electronic products such as cellular and cordless phones, power tools, laptop computers, camcorders, two-way radios and remote control toys.

More than 300 manufacturers support the recycling program by placing the RBRC's Battery Recycling Seals on rechargeable batteries and portable electronic products. This seal lets consumers and businesses know that the battery can be recycled.

The RBRC offers recycling plans for retailers, businesses, communities and public agencies. The program is free for consumers, retailers, communities and public agencies. Participating businesses only pay for shipping to the reclamation facility. The RBRC provides collection materials and pays recycling costs. Some states have disposal bans of Ni-Cd and Pb batteries that prohibit users from throwing used batteries into the trash. State law requires these batteries to be recycled or properly disposed of through manufacturer/distributor or other collection programs.

## END-OF-LIFE MANAGEMENT

### California

Batteries are considered hazardous because of the metals and/or other toxic or corrosive materials contained within. Batteries are potentially a valuable source of recyclable metal. All batteries in California that are intended for disposal must be recycled, or taken to a household hazardous waste disposal facility, a universal waste handler (e.g., storage facility or broker), or an authorized recycling facility.

According to an August 2002 California Integrated Waste Management Board report entitled, "[Household Universal Waste Generation in California](#)", there were 507,259,000 batteries sold in California in the year 2001. According to survey results published in the report, only 0.55 percent of these batteries were recycled.

Universal wastes are hazardous wastes that are more common and pose a lower risk to people and the environment than other hazardous wastes. Federal and State regulations identify universal wastes and provide simple rules for handling, recycling, and disposing of them. The regulations, called the "Universal Waste Rule," are in the [California Code of Regulations, Title 22, Division 4.5, Chapter 23](#).

Universal wastes include mercury thermostats and thermometers, batteries, fluorescent lamps, cathode ray tubes, medical instruments that contain mercury, and others. Not all universal wastes are subject to the same regulations or disposal requirements. In general, universal waste may not be discarded in solid waste landfills.

Universal waste batteries include rechargeable nickel-cadmium batteries, silver button batteries, mercury batteries, small sealed lead-acid batteries (burglar alarm and emergency light batteries), most alkaline batteries, carbon-zinc batteries, and any other batteries that exhibit a characteristic of a hazardous waste (toxic, reactive, ignitable or corrosive). NOTE: [Spent automotive-type lead-acid storage batteries](#) are not universal waste.

"Under [California's Universal Waste Rule](#), households and conditionally exempt small quantity generators were allowed to dispose batteries (not lead/acid batteries of the type used in autos), fluorescent lamps, mercury thermostats, and electronic devices to the trash through February 8, 2006. Local trash companies or other agencies were allowed to ban these items from the trash any time before February 8, 2006. Large and small quantity handlers are required to ship their universal waste to another handler, a universal waste transfer station, a recycling facility, or a disposal facility. Under [California's Universal Waste Rule](#), specified waste generators were permitted to send specified universal wastes to landfills, but this disposal allowance has expired." [\[7\]](#)

Contact the California Department of Toxic Substances Control ([DTSC](#)) [office near you](#) for more information. Also see the DTSC Web page on [universal waste](#).



### **Automotive-Type Lead-Acid Storage Batteries**

Spent automotive-type lead-acid storage batteries are not universal waste. They are hazardous wastes that require management as specified in [California Code of Regulations, Title 22, Division 4.5, Chapter 16, Article 7](#).

### **Federal**

"The U.S. Congress passed the Mercury-Containing and Rechargeable Battery Management Act in 1996 to make it easier for rechargeable battery and product manufacturers to collect and recycle Ni-CD batteries and certain small sealed lead-acid batteries. For these regulated batteries, the act requires the following:

- Batteries must be easily removable from consumer products, to make it easier to recover them for recycling.
- Battery labels must include the battery chemistry, the "three chasing arrows" symbol, and a phrase indicating that the user must recycle or dispose of the battery properly.
- National uniformity in collection, storage, and transport of certain batteries.
- Phase out the use of certain mercury-containing batteries." [\[8\],\[9\]](#)

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- [1] United States Environmental Protection Agency. Resource Conservation, Common Wastes & Materials, Batteries Web page. Available at [www.epa.gov/epawaste/conserve/materials/battery.htm](http://www.epa.gov/epawaste/conserve/materials/battery.htm)
- [2] United States Environmental Protection Agency. Municipal Solid Waste -- Commodities: Batteries Web page. Available at [www.epa.gov/epawaste/conserve/materials/battery.htm](http://www.epa.gov/epawaste/conserve/materials/battery.htm)
- [3] California Integrated Waste Management Board. Waste Prevention World, Rechargeable Batteries and Chargers Web page. Available at <http://www.calrecycle.ca.gov/ReduceWaste/Power/RechBattInfo.htm>. Accessed on March 1, 2006.
- [4] See also the [EcoLoGo<sup>TM</sup> Program](#) Certification Criteria Document (CCD-133). [Rechargeable Consumer Batteries](#).
- [5] Montana Pollution Prevention Program. Pollution Prevention Tips for Health Care Providers Web page. Available at <http://www.montana.edu/wwwated/>
- [6] United States Environmental Protection Agency. Mercury in Medical Waste: Use of Alternative Products Fact Sheet. Available at <http://www.p2pays.org/ref/01/00791.htm>.
- [7] California Integrated Waste Management Board. Waste Prevention Information Exchange - Batteries Web page. Available at <http://www.calrecycle.ca.gov/> Accessed on March 1, 2006.
- [8] United States Environmental Protection Agency. Resource Conservation, Common Wastes & Materials: [Batteries Web page](#).
- [9] Public Law 104-142. Mercury-Containing and Rechargeable Battery Management Act. May 13, 1996. Available at [US EPA Wastes](#).

## **Building Maintenance (BM)**

- [Carpet](#)
- [Cleaning Products](#)
- [Garbage/Recycling Services](#)
- [Lighting/Occupancy Sensors](#)
- [Paint](#)
- [Plastic Trash Bags](#)
- [Structural Integrated Pest Management \(IPM\)](#)
- [Water-Efficient Fixtures & Appliances](#)



## BM – Carpet

### Environmental and Health Issues and Recommendations

***Purchasing carpet that is certified as meeting the [California Gold Sustainable Carpet Standard](#) will help you address the following environmental and health issues:***



#### **Prevents Waste, End-of-Life Management:**

About 840,000 tons of carpet - roughly two percent of California's waste stream - end up in California landfills every year. [\[1\]](#) Preventing waste can conserve natural resources and save landfill space. You prevent waste when you:

- Reduce the amount of material you buy to accomplish any task;
- Reuse a product; or
- Purchase carpet products from manufacturers that meet or exceed the end-of-life recycling goals of the Carpet Area Recovery Effort (CARE). Many manufacturers have carpet take-back programs in place and reclaim and recycle the carpet they replace.

In addition, carpet tiles can be replaced as they are damaged or wear out, rather than requiring the replacement of a whole area of carpet.



#### **Recycled Content:**

Many carpets are available with recycled content. Look for products that contain postconsumer material, which is finished material that has completed its life cycle as a consumer item, and would have been disposed of as a solid waste, but is instead diverted from landfill disposal and recycled or reused. Purchasing recycled-content products that are made with postconsumer material directly supports the recycling programs of local jurisdictions.

Compared to manufacturing with virgin materials, which for carpet products are usually derivatives of petroleum products, making carpet with recycled materials usually:

- Requires less energy;
- Conserves natural resources;
- Emits lower levels of climate-changing gases; and
- Produces less pollution.



#### **Less Hazardous:**

Buying carpet that does not contain toxic or hazardous chemicals or materials reduces pollution and protects human health and the environment.



#### **Indoor Air Quality (IAQ):**

Look for carpet products as well as carpet adhesives that emit zero- or low- amounts of volatile organic compounds (VOC) and meet California's [Section 01350 specification](#) or the Green Label Plus criteria from the [Carpet and Rug Institute](#) (CRI). VOCs often have an odor, and are often characterized as the "new carpet smell." Low-VOC versions of carpet products are readily available, and many commercial carpet products now meet the Green Label Plus criteria.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Needs Assessment](#)
- [Laws and Policies](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Environmentally Preferable Cleaning and Maintenance](#)
- [Purchasing Resources](#)
- [Benefits of Using California Multiple Award Schedules \(CMAS\) Contracts](#)
- [Buying Products from California Multiple Award Schedules \(CMAS\) Contracts](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

About 840,000 tons of carpet - roughly two percent of California's waste stream - end up in California landfills every year. [\[2\]](#) Purchasing environmentally preferable carpet can reduce waste, support recycling and recycled-content product procurement, and protect the health of building occupants by reducing the amount of volatile organic compounds that escape into indoor air from new carpeting. For details, see the environmental and health issues and recommendations discussed at the beginning of this chapter.

## NEEDS ASSESSMENT

Before you purchase a product, consider the task that you wish to accomplish with the product. Do you really need to make a purchase? Can your existing product be cleaned or repaired to extend its life? A thorough carpet maintenance program can greatly extend a carpet's life, and greatly improve the human health attributes of carpet.

When you purchase new carpet, look for those products with [environmentally preferable attributes](#).

## LAWS AND POLICIES

### California

#### ***California Gold Sustainable Carpet Standard***

After August 31, 2006, all carpet purchased by the State of California is required to be independently certified to meet the criteria of the [California Gold Sustainable Carpet Standard](#) (PDF, 298 KB). This came into effect through [State Management Memo 06-08](#) (PDF, 41 KB) and applies to all carpet purchased for new construction, renovations, replacement carpet, through State Procurement, California Multiple Award Schedules (CMAS) contracts, or any other procurement method. This applies whenever there are three or more products that meet the Standard, and the only exception is for the patching and repair of carpet within an existing field of carpet.

The California Gold Sustainable Carpet Standard is built on [NSF-140](#) (PDF, 331 KB), a national standard currently going through the American National Standards Institute (ANSI) review process as a draft standard. The NSF-140 Standard uses a point system including nine prerequisite credits and up to 114 possible points and four levels of attainment (Bronze, Silver, Gold, and Platinum). Points are obtained in the following five categories:

- Safe for Public Health and Environment
- Renewable Energy and Energy Efficiency
- Recycled Content or Biobased Materials
- Facility or Company Based Practices
- Reclamation, Sustainable Reuse, and End of Life Management

The California Gold Sustainable Carpet Standard takes the NSF-140 national standard further by adding 14 additional prerequisites in areas important to California and a full 100 percent audit by a third party certification organization, as well as at least 52 credits overall from all categories. California Platinum certification requires all prerequisites and at least 71 credits overall from all categories. Additionally, California Gold only recognizes and accepts products that meet these highest two levels: California Gold and California Platinum. The additional prerequisites added include requirements for:

- Carpet must contain at least 10 percent postconsumer content
- Carpet must meet the low emission requirements of the Carpet and Rug Institute's *Green Label Plus™* program or [California's Section 01350](#) specification
- Carpet must not contain polybrominated diphenyl ether (PBDE) flame retardants
- Manufacturer must have completed a life cycle assessment (LCA) process for the product category
- Carpet manufacturer must meet the Carpet America Recovery Effort (CARE) recycling goals

Audits and the third party certification program are currently administered by [Scientific Certification Systems](#) (SCS) through their Sustainable Choice program .

### ***Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ Certification***

[Executive Order S-20-04](#) requires that all new and renovated State-owned facilities be designed and built to meet the U.S. Green Building Council's ([USGBC](#)) Leadership in Energy and Environmental Design ([LEED](#)) requirements. The [Green Building Action Plan](#) (PDF, 34 KB) - detailed direction that accompanies Executive Order S-20-04 - asserts that all new State buildings and major renovations of 10,000 square feet and over must be designed, constructed and certified at LEED for New Construction and Major Renovations (LEED-NC) Silver or higher, or LEED for Existing Buildings (LEED-EB), as applicable. Smaller building projects must use the same design standard, but do not require certification. The purchase of California Gold or California Platinum certified carpet qualifies the project for attainment of the [LEED-NC v2.2](#) (PDF, 448 KB) Indoor Environmental Quality (EQ) Credit 4.3, as well as the Collaborative for High Performance Schools (CHPS) credit ME 4.6.1.

### ***State Agency Buy Recycled Campaign (SABRC)***

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on plastic products be spent on plastic products with at least 10 percent postconsumer recycled content [exception: see content requirements for printer and duplication cartridges in [PCC 12209\(f\)\(2\)](#)].
  - The SABRC plastic products (PL) category includes, but is not limited to, carpet, printer or duplication cartridges, diskettes, office products, plastic lumber, buckets, wastebaskets, containers, benches, tables, fencing, clothing, mats, packaging, signs, posts, binders, sheet, buckets, building products, garden hose, and trays (see [PCC section 12207](#)).
- Recycled-Content Certification Requirements

- [PCC section 12205](#) requires all State agencies to obtain from all businesses written certification of the postconsumer content of each product offered or sold to the State. The certification shall be provided regardless of the content, even if the product contains no recycled material. However, a State agency may waive the certification requirement if the percentage of postconsumer material can be verified in a written advertisement, including, but not limited to, a product label, a catalog, or a manufacturer or vendor Web site. If written certification is necessary, use of form CIWMB 74, available on the [CIWMB Web site](#), is a means of meeting the requirement. All supporting certifications are to be kept and available upon request.
- Carpets with California Gold or Platinum certification contain a minimum of 10 percent postconsumer material. State agencies with questions about SABRC certification for these products should contact the California Integrated Waste Management Board's [State Agency Assistance Section](#).
- Recycled-Content Product Procurement Report
  - [PCC section 12211](#) requires PL purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

## Federal

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the [Comprehensive Procurement Guidelines](#) (CPG). Carpet cushion and polyester carpet (the State of California usually purchases nylon carpet) are USEPA-designated items. "Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable." [3] This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [4],[5] The USEPA's recommended recovered materials content levels for carpet cushion and polyester carpet (the State of California usually purchases nylon carpet) are available on-line. "Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products." [6]

## PERFORMANCE

Environmentally preferable (EP) carpets meet the same industry performance standards as their non-EP counterparts, while carrying the same manufacturer warranties for high traffic wear, fire rating, stain resistance, and color fade, given similar appropriate uses.

Select EP carpet that is appropriate for the intended use. Some carpets are recommended for light- to moderate-use areas, such as private offices, while others are rated for wider applications, including heavier-use areas like hallways and entrances.

There are many general performance evaluation considerations to weigh, including:

- Evaluating options based on the recycled content and recyclability of the face fiber, backing, and cushion.
- Evaluating the density and durability of the fiber, as well as the color and pattern, for the expected traffic level and use.
- Evaluating options that make spot replacement easier and delay full replacement, such as carpet tiles and easy-to-blend patterns.
- Evaluating VOCs associated with both the carpet and the installation adhesives to minimize off-gassing that can be harmful to both installers and occupants.

## AVAILABILITY

### Modular Carpet

Modular carpet is often the carpet product of choice for building spaces utilizing open modular systems furniture, or other modular office systems. This allows carpet to be replaced more easily with furniture in place without dismounting furniture systems. Other advantages include the ability to remove and replace a few stained, worn or damaged tiles at a time, instead of the entire carpet, extending the life of remaining carpet tiles. Modular carpet tiles are available in several sizes including 0.5 meter and 1.0 meter square tiles. They typically include a dimensionally stable backing, sometimes including some cushion or padding. Some modular carpet products are manufactured with a releasable adhesive already adhered to its backing, making installation easier.

### Broadloom Carpet

Broadloom or roll goods types of carpet can sometimes be an appropriate choice for some building settings. Broadloom carpets typically use less material, particularly in the backing, and are often used in corridors, or in large or small rooms where individual pieces of furniture are used that can be easily moved. By using less material, broadloom carpets typically weigh less, and cost less, and in some situations may be considered more sustainable.

Some broadloom carpets include some extent of padding integrated into the backing. When carpet pad is desired, take care to use carpet pad that is high in postconsumer recycled content with low or no emissions. Some carpet pad products are made from 100 percent postconsumer recycled content carpet.

### Environmentally Preferable Product Attributes

Some of these environmental attributes may be found in environmentally preferable carpets:

- Durability
- [Recycled content](#)
- [Low or zero air emissions](#) and [hazardous substances](#)
- Material efficiency
- Easy, non-hazardous maintenance
- Recyclable
- [End-of-life management](#) that keeps materials out of landfills (e.g., reuse, recycling, return to manufacturers)
- Low embodied energy and/or utilizing renewable energy in manufacturing process
- Low life cycle cost

### Adhesives

Besides environmentally preferable carpet products, it is important to consider the impact of carpet adhesives used to install carpeting. Some products are available with adhesives pre-applied to the carpet's backing, either utilizing a peel-off backing sheet, or not. This can reduce the amount of installation time, and in many cases, may allow, for example, self-adhered carpet tiles in high-wear areas to be swapped out with tiles from a low-wear location to extend the wear without reapplying adhesive.

It is important to specify and use low-emitting carpet adhesives, concrete moisture sealers, cove base adhesives, and other carpet-related products. The Carpet and Rug Institute (CRI) has developed a low-emitting carpet adhesive program referred to as the Green Label Plus Adhesive Testing Program, which meets low emission requirements consistent with California's [Section 01350 specification](#), as well as the [Collaborative for High Performance Schools](#) (CHPS) Low-Emitting Materials Credit 2 for use in a typical classroom. Additionally, the USGBC's [LEED](#) Green Building Rating System awards a credit in its Indoor Environment Quality Section for the use of Low-Emitting Materials - Adhesives and Sealants (EQ Credit 4.1).

## COST

Carpets featuring environmentally preferable attributes are fully competitive with carpet lacking these attributes. Many carpet manufacturers now manufacture carpet products that meet the California Gold or other sustainable carpet criteria with no cost premium over comparable performing carpets.

## **SPECIFICATIONS**

### **California**

After August 31, 2006, all carpet purchased by the State of California is required to be independently certified to meet the criteria of the [California Gold Sustainable Carpet Standard](#) (PDF, 298 KB).

### **Other**

**United States Environmental Protection Agency (USEPA), [Database of Environmental Information for Products and Services](#).** Among other things, this database contains contract language, specifications, and policies created and used by federal and state governments and others to buy environmentally preferable products and services.

## **ENVIRONMENTALLY PREFERABLE CLEANING AND MAINTENANCE**

A thorough carpet maintenance program can greatly extend a carpet's life, and greatly improve the human health attributes of carpet. The use of environmentally preferable cleaning methods and safe cleaning chemicals will extend the useful life of a carpet and protect human health. The Environmentally Preferable Purchasing Best Practices Manual [chapter on cleaning products](#) provides valuable information on green cleaning methods and products. Additionally, existing buildings using green cleaning practices can earn credit for the [LEED for Existing Buildings \(LEED-EB\)](#) Rating System's Indoor Environmental Quality Credit No. 10.3. This can contribute to the attainment of LEED-EB certification, which is [mandated](#) for all State of California buildings larger than 50,000 square feet.

## **PURCHASING RESOURCES**

### **California Gold Sustainable Carpet Standard**

A list of carpet manufacturers and backing systems certified to meet the State mandated standard is available on-line. Additionally, Scientific Certification Systems (SCS) maintains a list of carpet products that have been certified to the State standard, as well as their Sustainable Choice standards. Local government agencies and school districts in California can purchase many carpet products meeting the California Gold Sustainable Carpet standard through California Multiple Award Schedules (CMAS) contracts through vendors listed on the CMAS Contracts with Green/Recycled Content Web page. Be sure to ask specifically for products certified as **California Gold** or **California Platinum**. See also "[How can I buy products from California Multiple Award Schedules \(CMAS\) contracts?](#)"

### **California Integrated Waste Management Board (CIWMB)**

The CIWMB's [Recycled-Content Product Directory](#) lists thousands of products containing recycled materials as well as information about the manufacturers, distributors, and re-processors of these products.

### **Collaborative for High Performance Schools (CHPS)**

CHPS has developed useful guidelines for carpet attributes, selection, installation and maintenance [see CHPS Best Practices Manual for Design pp. 139-146].

### **United States Environmental Protection Agency (USEPA)**



The USEPA's Comprehensive Procurement Guidelines (CPG) Supplier Database is a searchable database of vendors who sell or distribute CPG-designated products with recycled content. The USEPA also maintains a [Database of Environmental Information for Products and Services](#).

## **WHAT ARE THE BENEFITS OF USING CALIFORNIA MULTIPLE AWARD SCHEDULES (CMAS) CONTRACTS?**

California's California Multiple Award Schedules (CMAS) contracts offer streamlined and efficient methods of acquiring carpet at previously established costs from already recognized contracts and substantial savings. These carpets are included in the CMAS Contracts with Green/Recycled Content List.

## **HOW CAN I BUY PRODUCTS FROM CALIFORNIA MULTIPLE AWARD SCHEDULES (CMAS) CONTRACTS?**

Detailed contract user instructions are available on the Department of General Services Procurement Division's Web site in the Purchasing Authority Manual (PAM) Chapter 6 Section B. See also the "Carpet" heading in the Sources - Products Available with Environmental Attributes: State Contracts and Prison Industry Authority chapter of the Environmentally Preferable Purchasing Best Practices Manual.

Local agencies and California school districts may use State procurement contracts .

## **SUCCESS STORIES**

- See the Carpet section of the *Environmentally Preferable Purchasing Guide* published by the Solid Waste Management Coordinating Board of Minnesota.
- [California Environmental Protection Agency Headquarters](#)

## **RESOURCES AND WEBSITES**

See also [PURCHASING RESOURCES](#).

### **[California Department of General Services \(DGS\)](#)**

West Sacramento, CA

(916) 375-4400

DGS's [California Gold Sustainable Carpet Standard](#) is available on-line.

### **[California Integrated Waste Management Board \(CIWMB\)](#)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

See the CIWMB's [Construction and Demolition Recycling - Carpet Web page](#).

### **[Carpet America Recovery Effort \(CARE\)](#)**

CARE is a joint industry-government effort to increase the amount of recycling and reuse of postconsumer carpet and reduce the amount of waste carpet going to landfills. CARE was established as a result of a Memorandum of Understanding for Carpet Stewardship, a national agreement signed by members of the carpet industry, representatives of government agencies at the federal, state and local levels, and non-governmental organizations. See CARE's end-of-life recycling goals.



**Carpet and Rug Institute (CRI)**

Dalton, GA  
(706) 278-3176

The CRI is the national trade association representing the carpet and rug industry. See its [Green Label Plus](#) program criteria for indoor air quality.

**Collaborative for High Performance Schools (CHPS)**

(877) 642-CHPS

The Collaborative for High Performance School's goal is to facilitate the design of high performance schools: environments that are not only energy-efficient, but also healthy, comfortable, well-lit, and containing the amenities needed for a quality education. CHPS has developed useful guidelines for carpet attributes, selection, installation and maintenance [see *CHPS Best Practices Manual for Design* pp. 139-146]

**King County Environmental Purchasing Program**

Seattle, WA  
(206) 296-0100  
(800) 325-6165

King County is an environmental procurement pioneer. See the Environmental Purchasing Program's Environmentally Responsible Carpet Choices Web page.

**United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

The USEPA's mission is to protect human health and the environment. See the following on-line resources:

- Comprehensive Procurement Guidelines (CPG)
  - Recommended Recovered Materials Content Ranges for carpet cushion and polyester carpet (the State of California usually purchases nylon carpet).
  - CPG Supplier Database. A searchable database of vendors who sell or distribute CPG-designated products with recycled content.
  - 2004 Buy-Recycled Series: Construction Products fact sheet
- [Database of Environmental Information for Products and Services](#). This database provides contract language, specifications, and policies created and used by federal and state governments and others to buy environmentally preferable products and services; environmental standards and guidelines for products; vendor lists of product brands which meet these standards; and other useful sources of information on products and services that are more environmentally preferable.
- Environmentally Preferable Purchasing - [Carpet Resources Web page](#)

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[1] California Department of General Services. News Release: California State Government Takes the Lead, Reducing the Flow of Old Carpets Into Landfills. June 13, 2006.

[2] California Department of General Services. News Release: California State Government Takes the Lead, Reducing the Flow of Old Carpets Into Landfills. June 13, 2006.

[3] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Construction Products Fact Sheet.

[4] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.

[5] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Construction Products Fact Sheet.

[6] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Construction Products Fact Sheet.

## BM – Cleaning Products

### Environmental and Health Issues and Recommendations



#### Less Hazardous:

Choosing less-hazardous products can minimize harmful impacts to custodial workers, improve indoor air quality, and reduce water pollution.



#### Indoor Air Quality:

Indoor air quality can be affected by volatile organic chemicals that are present in some cleaning products. Products with corrosive, carcinogenic, and irritating chemicals should be avoided.



#### Prevents Waste:

Buying cleaners in concentrates and returnable or reusable packaging reduces packaging waste.



#### End-of-Life Management:

Buying less-hazardous cleaners may reduce your hazardous waste costs when it comes time to properly dispose of any leftover cleaners.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Policies](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

### BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Professional janitors use a number of cleaning and maintenance products as they perform their work. Janitors use general purpose cleaners, bathroom and tile cleaners, and glass cleaners on a daily basis. They may use products such as carpet cleaners, dusting aids, floor wax strippers and floor polishes on an occasional or periodic basis. Each year about six out of every 100 professional janitors are injured by the chemicals in the products that they use. Burns to the eyes and skin are the most common injuries, followed closely by breathing toxic fumes. [1] Repeated long-term exposure may cause chronic illnesses or allergic reactions to workers who are exposed to chemicals regularly.

Additionally, Californians wash tons of liquid cleaners down the drain, which may eventually flow into our rivers and ocean, or end up on agricultural land. For example, researchers found that approximately 75 percent of the antibacterial hand soap ingredient, triclocarban, persists during wastewater treatment and accumulates in municipal sludge, which later is used as fertilizer for crops. [\[2\]](#)

A commitment to green cleaning can potentially help agencies, municipalities, or companies improve safety and reduce health risks associated with the use, storage, or disposal of chemicals used in traditional cleaning and it may even improve attendance. [\[3\]](#)

### **What is Green Cleaning?**

Green cleaning involves using green or environmentally preferable products and practices. Green or environmentally preferable products include products that are certified to contain lower or insignificant amounts of toxic or hazardous chemicals and have reduced or minimal adverse environmental impacts. Green or environmentally preferable cleaning practices refers to methods and practices that reduce the exposure, of both janitorial staff and building occupants, to toxic or hazardous chemicals and the release of polluting chemicals into the environment.

Building managers and procurement officers are encouraged to give preference to the purchase and use of green cleaning products and practices when appropriate. Many green janitorial products, such as general purpose, bathroom, glass or carpet cleaners, are available that have received independent third-party certification regarding their overall performance and environmental impact (see [Availability](#)).

Additionally, facilities can potentially reduce regulatory, procedural, and financial burdens by switching to green cleaning products and practices.

### **Indoor Air Quality**

Traditional cleaning products may contain ingredients that are toxic or hazardous, including some chemicals known as Volatile Organic Compounds (VOC). VOCs may be added to cleaning products as the active or functional cleaning ingredient or as a fragrance. Some VOCs may be toxic when in contact with skin or when inhaled. Additionally, non-visible particles of a size that can be inhaled may be formed during the use of some cleaning products.

Exposure to toxic or hazardous ingredients and inhalable-size particles is cause for concern as adverse health effects may result that include skin, eye, and respiratory irritation, rashes, and even cancer. Because a custodian is in close proximity to the use of the chemicals, he or she will experience the greatest risk. Other workers entering areas being cleaned or working nearby and building occupants can also be exposed to varying levels of VOCs and inhalable-size particles after cleaning products are used. Generally, these volatile chemicals and particles are diluted or removed through regular building ventilation or removed from the air by settlement on surfaces. But many buildings are cleaned after core work hours when ventilation systems are not in operation or greatly reduced, potentially heightening exposure of janitors or staff.

### **Persistent Chemicals**

An emerging concern is the use of antibacterial chemicals, triclosan and triclocarban, that break down slowly and can build up in the environment. These chemicals are found in many antibacterial consumer products. Additionally there is concern that widespread use of these products may help create germs resistant to antibiotics. [\[4\]](#) Avoid products with persistent chemicals.

### **LAWS AND POLICIES**

Some of the following laws and policies primarily affect upper management in an agency, municipality, or company, while others directly impact janitorial management and staff.

Changing cleaning practices and using less toxic products can improve safety and reduce health risks to workers and occupants and can reduce certain regulatory requirements, which can save organizations money.

## **California**

### ***Statutes and Regulations***

- **California Occupational Safety and Health Administration (Cal/OSHA)**

Most agencies, municipalities, or companies that use dangerous chemicals in the workplace are regulated by Cal/OSHA. Regulations require employers to protect the health and safety of their employees through training, use of certain procedures (including personal protection), development of emergency plans, and more.

- **Hazardous Substances Information and Training Act (Labor Code sections 6360 - 6363)**

This act explains duties of employers with respect to employee safety when hazardous substances are in the workplace. Employers must obtain and make available Material Safety Data Sheets (MSDS) for every hazardous material used in the workplace, including those in cleaning products. MSDSs are prepared by manufacturers and describe the properties of hazardous materials and protective measures to take when handling them. Employees must be provided with training. Cal/OSHA oversees these requirements. For more information, see Cal/OSHA's [Guide to the California Hazard Communication Regulation](#).

- **Volatile Organic Compounds (VOC)**

[Pursuant to section 41712 of the Health and Safety Code](#), the California Air Resources Board (ARB) has adopted maximum allowable VOC levels that apply to many consumer and institutional cleaning and maintenance products. To be sold in California, cleaning and maintenance products must comply with applicable percent VOC by weight standards listed in the Table of Standards in section 94509(a) of Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5, Article 2, Consumer Products, sections 94507-94517 (available on [ARB's Web site](#).)

It should be noted that the VOC content limits have been established primarily for outdoor air quality purposes - to attain state and federal ambient air quality standards for ozone and particulate matter. However, it would not be unreasonable to assume that California VOC content limits provide some indoor air quality benefits. California consumer and institutional products requirements are also more extensive and VOC content limits are as stringent, or more stringent than, comparable federal and other states' requirements.

- **Rigid Plastic Packaging**

Statutory provisions contained in Sections 42300 through 42345 of the Public Resources Code govern the [Rigid Plastic Packaging Container Program](#). Rigid plastic packaging for cleaning products shall be compliant with the Rigid Plastic Packaging Container (RPPC) law. Information on what constitutes a RPPC, who must comply, how compliance is determined, exemptions, penalties and more, is available from the [California Integrated Waste Management Board \(CalRecycle\)](#). The State agency or contractor, property manager, etc., using these guidelines must request that the janitorial supplier provide written proof that the cleaning products' containers which they are providing are compliant with the RPPC law. The proof may include recent product manufacturer RPPC certifications; labels stating that the container meets one of the RPPC compliance options; or a signed letter from the product manufacturer stating that each of their containers, or the containers on average, specifically meet one of the RPPC compliance options. This information must be supplied to RPPC program staff at (916) 319-7772 (RPPC dedicated fax line), or by email. For more information on the [RPPC law](#), [see the regulations](#).

- **State Agency Purchase of Prison Industry Authority (PIA) Products**

PIA has numerous industrial enterprises including the manufacture of cleaning products. [California Penal Code section 2807](#) states that, "State agencies shall make maximum utilization of these products, and

shall consult with the staff of the authority to develop new products and adapt existing products to meet their needs."

- **Safe Drinking Water and Toxic Enforcement Act, Proposition 65**

Proposition 65 requires California's governor to publish a list of chemicals that are known to the State of California to cause cancer, birth defects, or other reproductive harm. This list must be updated at least once a year. More than 550 chemicals have been listed as of April 1, 1996. Proposition 65 imposes certain controls that apply to chemicals that appear on this list. These controls, designed to protect California's drinking water sources from contamination by these chemicals, allow California consumers to make informed choices about the products they purchase, and enable residents or workers to take actions to protect themselves from exposures to these harmful chemicals. Cleaning products without Proposition 65 listed chemicals do not have these regulatory requirements.

- **Hazardous Waste**

If organizations manage (generate, transport, store or treat or dispose of) hazardous waste in California, they must follow California's [hazardous waste laws and regulations](#). These laws and regulations impose certain rules upon the [generator of hazardous waste](#) (usually the building in which the wastes are created and/or the cleaning company itself), including recordkeeping, storage, disposal requirements, and emergency procedures.

### ***Policy***

[Executive Order S-20-04](#) includes a provision that State agencies, departments, and other entities under the direct executive authority of the governor, design, construct and operate state-owned facilities paid for with state funds as Leadership in Energy and Environmental Design (LEED) Silver or higher certified buildings.

[LEED for Existing Buildings](#) awards points for using cleaning products that are [Green Seal 37 Certified](#) , or if Green Seal 37 is not applicable (e.g., carpet cleaners, floor finishes or strippers), LEED-EB says to use products that comply with the California Code of Regulations maximum allowable VOC levels.

The use of Green Seal 37 Certified products is also recommended in the guidelines titled [Collaborative for High Performance Schools \(CHPS\) Best Practices Manual, Volume IV: Maintenance and Operations](#). The Division of the State Architect selected the CHPS guidelines for public schools, in response to Executive Order S-20-04.

**State of California, Purchasing Authority Manual.** Chapter 3 contains environmental policies (see topic 9).

[State of California, State Administrative Manual. Chapter 1900](#) describes waste prevention and recycling policies.

### **Federal [\[5\]](#)**

**Executive Order 13101 - Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition** - requires federal procurement officers to consider environmental factors in their purchasing and contracting decisions and directed the United States Environmental Protection Agency (USEPA) to develop guidance to address environmentally preferable purchasing.

The USEPA oversees several regulations and laws affecting the janitorial industry:

- National Volatile Organic Compound Emission Standards for Consumer Products. [Federal Register/Vol. 63, No. 176/Friday, September 11, 1998/Rules and Regulations, 48819-48847](#) (available on-line).

- Clean Water Act. If companies discharge dangerous chemicals directly or indirectly into the waters of the United States, they might be regulated under the [Clean Water Act](#). The Clean Water Act specifies chemicals and chemical limits that can and cannot be discharged into the public sewer system, as this wastewater is eventually discharged into surface waters such as rivers or streams. Concerns for janitorial companies include chemicals or mixtures poured into sinks or toilets, such as floor finish containing zinc or toilet bowl cleaner containing hydrochloric acid.
- Resource Conservation and Recovery Act (RCRA). If organizations create wastes that are hazardous (for example, rags that are soaked in solvents, unused cleaning chemicals that become waste, or residue from spills), they are regulated under the [Resource Conservation and Recovery Act](#) (RCRA). RCRA imposes certain rules upon the generator of hazardous waste (usually the building in which the wastes are created and/or the cleaning company itself), including recordkeeping, storage, disposal requirements, and emergency procedures.

In 1991, the USEPA authorized the State of California to implement the federal Resource Conservation and Recovery Act (RCRA) in this state. The authorization was based on the determination that [California's Title 22, Division 4.5](#), incorporates that portion of Title 40 of the [Code of Federal Regulations](#) (40 CFR) which contains the federal hazardous waste regulations (RCRA regulations). In fact, the California program is more stringent in many respects. By following the California regulations, you are also following the federal regulations. For new federal regulations that have not yet been adopted by California, check with the Department of Toxic Substances Control's (DTSC) [Regional Duty Officer](#) for the status of the regulation.

## PERFORMANCE

Many green or environmentally preferable cleaning products are as effective as traditional cleaners; however, some environmentally preferable cleaners are used differently than their traditional counterparts, making training critical for the successful use of the product.

One way to determine a cleaner's effectiveness is to apply it according to instructions and test it on intended surfaces such as furniture, walls, and bathroom counters. To ensure best results when testing the performance of cleaners, ask vendors or manufacturers to provide training on the proper use of their products.

Additionally, select cleaners that have established performance criteria and products that have been independently tested to ensure the standards are met. The [Green Seal 37 standard](#) for institutional and industrial cleaners includes requirements for product performance. Additionally, several organizations have tested the performance of green cleaning products (see [Example of a Green Cleaning Program](#) and results from the [City and County of San Francisco's](#) pilot program to test less-toxic chemical products).

## AVAILABILITY

Environmentally preferable cleaners are now widely available. Many cleaning product manufacturers and distributors carry or distribute a line of Green Seal certified or other environmentally preferable cleaning products.

- [Certified Green Seal 37 Industrial Cleaning Products](#)
- [Design for Environment \(DfE\) recognized products](#)
- [California Prison Industry Authority](#) (PIA): PIA makes cleaning products for sale to state agencies and other public sector entities. Check with PIA to determine if a product conforms to Green Seal or other environmental and performance criteria.
- The Center for a New American Dream has a [list of products meeting Green Seal and/or Canada's Environmental Choice standards](#).

## COST



Environmentally preferable cleaners are generally competitively priced. This includes the purchase price of the product, the cost of meeting regulations for worker safety and environmental rules, and the costs of disposal for leftover product. [\[6\]](#) Additionally, the City and County of San Francisco found that it can use preferable products in place of existing products in 13 out of 14 product-types with no increased cost, [\[7\]](#) while the United States Department of Energy's Pacific Northwest National Laboratory found that green cleaning products cost much less than what they paid for non-green cleaning products. [\[8\]](#) Beware of claims that environmentally preferable products cost more. Concentrated products that are priced higher may actually be less costly to use when properly mixed. To accurately compare prices, assess the cost-per-application rather than cost-per-volume.

## SPECIFICATIONS

When soliciting vendor proposals, procurement officers should consider a full range of environmentally preferable attributes, along with overall performance and cost, consistent with state policy. Evaluating the environmental attributes of cleaners can be challenging. Some companies have changed their marketing schemes to use words such as "environmentally friendly" or "natural" on their product labels, when, in fact, their products still contain hazardous chemicals. Specifying a certified product from a third party, non-biased entity is one way to ensure that products have been screened to meet performance, along with environmental and public health, criteria.

Performance criteria can be addressed directly in the specifications for cleaning products. Since improper use can affect the performance of green cleaning products, vendors should be required to provide training to maintenance staff on the proper use of the products. Training is considered essential for successful implementation.

**U.S. Green Building Council, Leadership in Energy and Environmental Design for Existing Buildings (LEED-EB).** [State policy](#) directs state agencies to operate and maintain existing buildings to the LEED-EB Silver level. One way to obtain LEED-EB points is to use Green Seal 37 certified cleaning products, if applicable.

Currently, in the United States, more facilities are requiring Green Seal 37 certified cleaning products. Some governments use Green Seal 37 as a base requirement, and then add additional requirements or options. The Green Seal 37 standard is summarized below under "[Sample Specifications and Environmental Criteria](#)."

### California Procurement Requirements

#### ***Procurement Engineering Team of the Procurement Division of the Department of General Services***

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services (DGS) develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

Use of the State's Maintenance, Repair and Operations contracts is mandatory for all State departments with the exceptions noted below. Use of California Multiple Award Schedules (CMAS) agreements is also restricted unless the department has an approved exemption pursuant to Management Memo 05-11. All purchases against these contracts shall be exempt from the requirements of [Management Memo 03-10](#). Please refer to [Management Memo 05-11](#) for additional information regarding these contracts and an exemption process for purchasing outside the contracts by clicking on the links below.

- Non-Core items and PIA items
- Emergency purchases
- Purchases to achieve SB/ DVBE participation goals
- Purchases conflicting with the Governor's Executive Order on Sustainability (EO S-20-04)



- when purchasing less than the minimum order (\$250)

[Local agencies may use State procurement contracts.](#)

## **Sample Specifications and Environmental Criteria**

### **Green Seal 37 (GS-37), Industrial and Institutional Cleaners**

Green Seal develops leadership environmental standards and certifies products that meet certain performance and environmental criteria.

The [GS-37 standards](#) cover the topics below. See the standards for complete descriptions:

1. Toxic Compounds - Acute Toxicity
2. Carcinogens & Reprotoxins
3. Eye and Skin Irritation
4. Skin Sensitization
5. Combustibility
6. VOC Content
7. Aquatic Toxicity
8. Aquatic Biodegradability
9. Eutrophication
10. Packaging
11. Concentrate
12. Fragrances
13. Prohibited Ingredients
14. Training
15. Animal Testing
16. Labeling

Numerous [products](#) have already been certified, providing purchasers with many options for obtaining certified Green Seal 37 cleaners.

In addition, Green Seal has a standard for floor-care products (finishes and strippers) for institutional use, [GS-40](#). The standard identifies toxic substances, pH, zinc and other heavy metal content, ozone depleting content, and other criteria for identifying environmentally preferable floor finishes and strippers. There are several [Green Seal certified floor finishes and strippers](#) meeting this new standard.

### **City and County of San Francisco, *Technical Specifications for the Procurement of Janitorial Cleaners***

In 2005, the city of San Francisco used a stakeholder process that involved end users representing 10 city departments. A technical advisory group, which included five technical experts from USEPA Region IX, the Commonwealth of Massachusetts, and the State of Minnesota, provided specific comments on the specifications. The pilot program specifications used a point-based scoring system to determine whether a product passed or failed. This approach was modified slightly in 2004 to a pass-fail system, in order to better harmonize with the existing Green Seal GS-37 Standard for Industrial and Institutional Cleaners. The pass-fail approach was also considered simpler to implement by City staff. Sixteen criteria in the San Francisco specification correspond to the Green Seal GS-37 specifications (see above) with three additional criteria:

17. Additional Prohibited Ingredients (see page 6),
18. Skin Absorption Potential, and
19. Aerosol Containers Prohibited. [\[9\]](#)

## **Methods for Verifying Compliance**

For approaches like the one the city and county of San Francisco uses, there are several options that could be used to verify that a product conforms to the standard.

**Option 1:** When the products are GS-37 certified, the vendor submits an ASTM test for skin absorption, verifies that the product does not contain prohibited ingredients, and the product doesn't come in an aerosol can;

**Option 2:** the vendor hires a third party entity that certifies compliance with all 19 criteria; or

**Option 3:** the vendor submits all data to the government entity to analyze and evaluate for compliance; or

**Option 4:** the government entity pre-qualifies specific products (this is the approach the city and county of San Francisco used in 2004).

**United States Environmental Protection Agency (USEPA), [Design for the Environment \(DfE\)](#).**

The DfE label means, " ...that the DfE review team has screened each ingredient in the product for potential human health and environmental effects and that - based on currently available information, predictive models, and expert judgment - the product contains only those ingredients that pose the least concern among chemicals in their class." [\[10\]](#)

A [list of DfE recognized products](#) is available on-line. More information on how DfE recognition compares to Green Seal certification is available from the USEPA DfE program contact (see [Formulator Initiative](#)).

**County of Multnomah, Washington**

The County of Multnomah uses another approach in its BID No. B06-8707 titled "Environmentally Preferable Cleaning Products on a Requirements Basis" and requires either Green Seal 37 certification or USEPA Design for the Environment recognition.

**State of California.** Contact the [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services for information about state contract specifications. Also check contract information for "Maintenance, Repair and Operations" (MRO).

**State of Vermont.** The State of Vermont contract has several green cleaning products. Information on their selection process and specification criteria are available on-line.

**United States Environmental Protection Agency (USEPA), [Database of Environmental Information for Products and Services](#).** This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services. If you have a specification for an environmentally preferable product or service, consider asking the [USEPA](#) to include it in this database.

## **SUCCESS STORIES**

**Example of a Green Cleaning Program: California Environmental Protection Agency Headquarters**

As part of the California Environmental Protection Agency's (Cal/EPA) [Environmental Management System](#) (EMS) initiative, it is [policy](#) that all Boards, Departments, and Offices of the Cal/EPA work with Property Management at Headquarters to continue to use environmentally preferable practices and products.

The Joe Serna Jr. / Cal/EPA Building is recognized nationally as one of the most energy efficient and sustainable commercial office developments in the country having won several awards, including the U.S. Green Building Council's [LEED EB](#) Platinum level certification. Efforts to green this building are described in [Greening Your Building Toward Your Bottom Line](#). One of the practices implemented is green cleaning, which includes the use of Green Seal 37 certified products. Initially, the building operators selected three daily cleaners; now there is just one cleaner that is hydrogen peroxide based. Additionally, the cleaning staff cleans primarily during daytime hours, which reduces electricity consumption for nighttime lighting,

and provides other benefits such as reduced staff turnover and dramatically reduced janitorial complaints. Overall, the program achieved significant cost savings through a variety of practices.

#### Other

- [Commonwealth of Massachusetts](#), Operational Services Division
- Saint Paul, Minnesota City Hall Annex
- Also see [Resources and Web Sites](#) for additional information.

## RESOURCES AND WEBSITES

### **American Society for Testing and Materials (ASTM)**

West Conshohocken, PA  
(610) 832-9500

ASTM is an independent consensus based standard-setting organization that has issued guidance on procedures for developing a green cleaning program. The [Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings](#) (ASTM E-1971-05) was reissued in 2005 to help owners and operators of commercial and institutional buildings adopt green cleaning and housekeeping practices. The standard provides recommendations for developing a stewardship plan; provides guidance on evaluating cleaning processes and selecting, using, storing, and disposing of products; and discusses equipment, training, and communications activities for a green cleaning program; and ways to avoid adverse impacts to building occupants, cleaning personnel, the building structure itself and the environment. According to ASTM, following the principles set forth in this guide can lead to greater tenant/occupant satisfaction, reduced operational costs, and greater productivity of occupants and cleaning personnel. [\[11\]](#)

### **California Department of Health Services (DHS) Hazard Evaluation System and Information Service (HESIS) California Occupational Health Branch**

Richmond, CA  
(866) 282-5516

See the 1996 document titled *Understanding Toxic Substances, An Introduction to Chemical Hazards in the Workplace* that is available on the [DHS HESIS Educational Materials Web page](#).

### **California Department of Industrial Relations California Occupational Safety and Health Administration (Cal/OSHA)**

The Cal/OSHA Program is responsible for enforcing California laws and regulations pertaining to workplace safety and health and for providing assistance to employers and workers about workplace safety and health issues. The following documents include cleaning related topics:

- [Guide to the California Hazard Communication Regulation](#), 2002
- [Working Safer and Easier for Janitors, Custodians, and Housekeepers](#)

### **Collaborative for High Performance Schools (CHPS)**

(877) 642-CHPS

CHPS created a [Maintenance and Operations Manual](#) that has a set of guidelines for cleaning practices and product selection (pages 265-273 cover product selection). The California Division of the State Architect selected the CHPS guidelines for public schools, in response to [Executive Order S-20-04](#). Guideline CP2: Cleaning Products and Equipment includes detailed description of environmental considerations. Additionally, the CHPS guidelines cover the process for cleaning facilities, from needs assessment and custodial training, to safe chemical use and disposal. There are also specific recommendations for cleaning specific types of rooms (e.g., restrooms, cafeterias) and surfaces (e.g., carpets, window coverings).

**Office of the Federal Environmental Executive (OFEE)**

Washington, DC

(202) 343-9125

The OFEE's mission is to promote sustainable environmental stewardship throughout the federal government. The OFEE provides an overview of federal programs and activities to purchase greener cleaning products.

**Green Seal**

Washington, DC

(202) 872-6400

Green Seal is a nationally recognized nonprofit organization that certifies a variety of environmental products that pass stringent testing standards. Green Seal is an independent organization dedicated to protecting the environment by promoting the manufacture and sale of environmentally responsible consumer products. It has developed a consensus-based standard for industrial and institutional cleaners. Green Seal standards set forth a list of product requirements that are based on an assessment of the environmental impacts of product manufacture, use, and disposal and reflect information and advice obtained from industry, trade associations, users, government officials, environmental and other public interest organizations, and others with relevant expertise.

The Web site includes standards for [industrial and institutional cleaners](#) (GS-37) and [industrial floor-care products](#) (GS-40), a list of [certified products and manufacturers](#), and a report titled *Choose Green Report: Floor-Care Products*.

**INFORM**

New York, NY

(212) 361-2400

INFORM is an independent, nonprofit organization that conducts research aimed at practical solutions to complex environmental and health-related problems throughout this country and the world. See [Cleaning for Health: Products and Practices for a Safer Indoor Environment](#).

**Janitorial Products Pollution Prevention Project (JP4)**

Lafayette, CA

(925) 283-8121

The JP4 Web site includes fact sheets, purchasing specifications, and other outreach materials to advise users on the health, safety, and environmental consequences of janitorial products, including cleaners. See also the Janitorial Product Risk Evaluation page.

**King County Environmental Purchasing Program**

Seattle, WA

(206) 296-4210

A pioneer and contemporary model in environmental procurement, King County offers information on a broad range of issues in purchasing. Their Environmentally Preferable Cleaning Products Web page provides bid criteria for King County, the City of Seattle, and the states of Washington and Massachusetts, along with links to additional resources.

**Commonwealth of Massachusetts**

**Operational Services Division**

Boston, MA

(617) 720-3356

The Massachusetts Operational Services Division has seven product lines of environmentally preferable cleaners available on state contract. The [Web site](#) discusses product criteria and contract specifications.

**Minnesota Pollution Control Agency (MPCA)**

St. Paul, MN

(651) 296-6300 or (800) 657-3864

MPCA is a state agency that provides assistance on the purchase of environmentally preferable products such as [cleaners](#), as well as resources, assistance, grants, and loans in the areas of waste and pollution prevention, recycling, reuse, environmental education, and sustainable communities.

**City and County of San Francisco**

San Francisco, CA

(415) 355-3700

San Francisco developed the *Technical Specifications for the Procurement of Janitorial Cleaners* in 2005 and has a green cleaning program that complements and builds upon the Green Seal certification standards.

**City of Santa Monica**

Santa Monica, CA

(310) 458-2255

This Web site provides an [overview of the city's environmental programs](#). The city of Santa Monica developed environmental criteria to evaluate and select cleaners for a citywide contract.

**Toxics Use Reduction Institute (TURI)**

Lowell, MA

(978) 934-3275

TURI published a two-page flyer titled *10 Ways to Find Safer Cleaners*. Contact information is available on-line. For more information, contact TURI Lab Director Carole LeBlanc.

**United States Department of the Interior**

Washington, DC

(202) 208-3100

The manual titled *Guidance and Training on Greening Your Janitorial Business* provides basic information about preferred cleaning products and processes that can reduce health, safety, and environmental risks associated with janitorial services. It also outlines a way in which building managers can transition from traditional cleaning systems to "green" cleaning systems.

**United States Environmental Protection Agency (USEPA)**

Environmentally Preferable Purchasing Program

Washington, DC

(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products, including cleaning supplies, on its [Environmentally Preferable Purchasing Program](#) Web site. The USEPA and the United States General Services Administration jointly offer information on environmentally preferable commercial cleaning products through the [Cleaning Products Pilot Project](#). Additionally, the USEPA's [Design for the Environment](#) (DfE) program works with formulators of chemical cleaning products to design products that are less harmful to the environment.

**United States General Services Administration**

Washington, DC

As part of its mission to assist federal agencies, the General Services Administration (GSA) maintains a Web site on environmentally preferable products that meet federal purchasing requirements. The site includes a discussion of cleaning products and ordering information for the GSA Environmental Products and Services Guide for 2003-2004.

### U.S. Green Building Council

Leadership in Energy and Environmental Design (LEED) for Existing Buildings  
Washington, DC  
(202) 828-7422

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System® is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. The [LEED standard for existing buildings](#) includes cleaning related activities. California state facilities are directed to be operated and maintained as LEED Silver buildings under [Executive Order S-20-04](#).

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- [1] Western Regional Pollution Prevention Network Web site, Jan. 2002, <http://www.wrppn.org/Janitorial/jp4.cfm>.
- [2] Johns Hopkins Bloomberg School of Public Health, Web site article, *Sludge Recycling Sends Antiseptic Soap Ingredient to Agriculture*, announces article by Jochen Heidler, Amir Sapkota, and Rolf U. Halden, *Partitioning, Persistence, and Accumulation in Digested Sludge of the Topical Antiseptic Triclocarban During Wastewater Treatment*. Environmental Science & Technology. April 26, 2006. Article about research accessed May 11, 2006 at: [http://www.jhsph.edu/publichealthnews/press\\_releases/2006/halden\\_sludge.html](http://www.jhsph.edu/publichealthnews/press_releases/2006/halden_sludge.html).
- [3] The Center for a New American Dream, Presentation: *Green Cleaning in Schools, Protecting Students and the Environment*, slide 17, available at: [http://www.newdream.org/cleanschools/Clean\\_Schools.ppt#272,17](http://www.newdream.org/cleanschools/Clean_Schools.ppt#272,17).
- [4] Johns Hopkins Bloomberg School of Public Health, Web site article, *Sludge Recycling Sends Antiseptic Soap Ingredient to Agriculture*, announces article by Jochen Heidler, Amir Sapkota, and Rolf U. Halden, *Partitioning, Persistence, and Accumulation in Digested Sludge of the Topical Antiseptic Triclocarban During Wastewater Treatment*. Environmental Science & Technology. April 26, 2006. Article about research accessed May 11, 2006 at: [http://www.jhsph.edu/publichealthnews/press\\_releases/2006/halden\\_sludge.html](http://www.jhsph.edu/publichealthnews/press_releases/2006/halden_sludge.html).
- [5] United States Department of the Interior. Guidance and Training on Greening Your Janitorial Business Web site. Available Jan. 2006 at: <http://www.doi.gov/greening/sustain/basics.html>.
- [6] Minnesota Office of Environmental Assistance. Cleaners Web page, December 2002. Available at <http://www.pca.state.mn.us/oea/epp/cleaners-mn.cfm>
- [7] City and County of San Francisco, *Environmentally Preferable Purchasing Pilot Program, Volume I Final Report*, Appendices A-F, page ES-6, February 2003, available at: [http://www.sfenvironment.com/aboutus/innovative/epp/final\\_report.pdf](http://www.sfenvironment.com/aboutus/innovative/epp/final_report.pdf).
- [8] Sandra Cannon, Pacific Northwest National Laboratory Environmentally Preferable Purchasing Technical Assistance for the United States Department of Energy, email message, Feb 8, 2006.
- [9] City and County of San Francisco, Department of the Environment, "Technical Specifications for the Procurement of Janitorial Cleaners," March 2005.
- [10] United States Environmental Protection Agency, Design for the Environment Web site. Available Jan 2006 at: <http://www.epa.gov/dfe/>.
- [11] ASTM International Standards Web site, January 2006. Available at: <http://www.astm.org/> (search for E1971-05).

## **BM - Garbage and Recycling Services**

### **Environmental and Health Issues and Recommendations**



#### **End-of-Life Management:**



Waste prevention, reuse, and recycling are techniques for maximizing efficient use of our resources and minimizing waste or even achieving zero waste. California's [waste management laws](#) promote the management of all materials to their highest and best use, and protect public health and safety, natural resources, and the environment, in partnership with all Californians.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## BACKGROUND

The state of California has established goals for diverting waste from disposal at landfills and transformation facilities. The Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989) created the California Integrated Waste Management Board (CIWMB, Board) and a series of statewide reforms in waste management. AB 939 established the 50 percent waste diversion goal for local government based on an integrated waste management hierarchy that prioritized waste reduction and recycling over all other options. It inspired a renewed "Reduce, Reuse, Recycle" ethic and enhanced public outreach programs and environmental education curricula to spread the word. AB 939 also improved landfill safety requirements and protection for public health and the environment. These core programs have been strengthened with the addition of fee-based programs to improve recycling of used motor oil, the management of waste tires, and the management of electronic wastes.

In 1999, passage of Chapter 764, Statutes of 1999 (Strom-Martin, [AB 75](#)) mandated that each State agency or large State facility develop an integrated waste management plan by July 1, 2000; divert at least 25 percent of its solid waste from landfills or transformation facilities by January 1, 2002; and divert 50 percent by January 1, 2004.

More recently, the CIWMB adopted as one of its strategic goals zero waste, which is based on the concept that wasting resources is inefficient, and that efficient use of our natural resources is what we should work to achieve. It requires that we maximize our existing recycling and reuse efforts, while ensuring that products are designed for the environment and have the potential to be repaired, reused, or recycled.

Smart government waste management, or materials management, does more than simply set an example for California residents and businesses. It provides leadership. The CIWMB has committed to work with state agencies to promote zero-waste strategies and lead by example. Through these efforts, California is now a recognized leader in promoting waste management practices that protect resources and the environment.

It is important for State facility managers, purchasing officials, and building operations staff to carefully choose how their waste is managed. In general, Californians should try to recycle what can be recycled, recover materials from what cannot be recycled, and carefully choose how and where the remaining waste is disposed.



## **LAWS AND GUIDELINES**

The following laws, policies, and guidelines include several, but not all, which pertain specifically to managing materials or wastes that may be encountered in facilities.

### **California Statute**

#### **Integrated Waste Management Act (IWMA)**

Also known as AB 939 (Sher, Chapter 1095, Statutes of 1989), the IWMA created the Board, required each jurisdiction in the state to submit detailed solid waste planning documents for Board approval, set diversion requirements of 25 percent in 1995 and 50 percent in 2000, established a comprehensive statewide system of permitting, inspections, enforcement, and maintenance for solid waste facilities; and authorized jurisdictions to impose fees based on the types or amounts of solid waste generated. Fines and other sanctions may be imposed on jurisdictions failing to meet or maintain their goals. A more detailed description of the IWMA is available in the Board's [legislative history overview](#).

#### **State Agency Integrated Waste Management**

[AB 75](#) was passed in 1999 and the State Agency Model Integrated Waste Management Act (Chapter 764, Statutes of 1999, Strom-Martin) took effect on January 1, 2000. This bill added new provisions to the Public Resources Code (PRC), mandating that State agencies develop and implement an integrated waste management plan (IWMP); it also mandated that community service districts providing solid waste services report disposal and diversion information to the city, county, or regional agency in which the community service district is located. The changes brought about by AB 75 require each State agency or large State facility to develop an integrated waste management plan by July 1, 2000; to divert at least 25 percent of its solid waste from landfills or transformation facilities by January 1, 2002; and to divert 50 percent by January 1, 2004.

#### **[Electronic Waste Recycling Act of 2003](#) (Senate Bill 20 and Senate Bill 50)**

Key elements of the Electronic Waste Recycling Act include:

- Reduction in hazardous substances used in certain electronic products sold in California.
- Collection of an [electronic waste recycling fee](#) at the point of sale of certain products.
- Distribution of [recovery and recycling payments](#) to [qualified entities](#) covering the cost of electronic waste collection and recycling.
- Directive to recommend environmentally preferred purchasing criteria for state agency purchases of certain electronic equipment.

#### **Cell Phone Recycling Act of 2004**

This law, Chapter 891, Statutes of 2004 (Pavley and Kehoe, [AB 2901](#)), requires that as of July 1, 2006 retailers selling cell phones in California have a system for the acceptance and collection of used cell phones for reuse, recycling, or proper disposal. This applies to State agency purchased or leased phones, too.

#### **Waste Reduction at Large Venues and Events**

State law [Chapter 879, Statutes of 2004 (Montanez, AB 2176)] requires the largest venue facilities and events (as defined) in each city and county to begin planning for solid waste reduction, and annually report the progress of their recycling and waste reduction programs to their local government. The law

also directs the California Integrated Waste Management Board to provide [guidance](#) and assistance to venues and local governments in meeting their obligations.

### **Regulations**

#### **California Universal Waste Rule (UWR)**

The [Universal Waste Rule](#) is set forth in Title 22 of the California Code of Regulations. "Universal wastes are hazardous wastes that are generated by a wide variety of people. Examples include batteries and fluorescent tubes. Universal waste rules allow common, low-hazard wastes to be managed under less stringent requirements than other hazardous wastes.

California's Universal Waste Rule became effective on February 8, 2002. Since that time, several other common wastes have been added to the list of universal wastes. These include mercury wastes, consumer electronic devices and cathode ray tubes (CRTs)." [\[1\]](#) Additional information about universal wastes is available from the California [Department of Toxic Substances Control](#).

### **Policies**

- **State Agency Recycling**, [Executive Order W-7-91](#). This executive order requires State agencies provide for the collection and recycling of: aluminum, glass, plastic and metal containers; white office paper, colored paper, corrugated cardboard, newspaper; and surplus reusable equipment and other materials generated in sufficient quantities for a viable recycling and reuse effort.
- **State of California**, [State Administrative Manual](#). Chapter 1900 describes waste prevention and recycling policies

### **Federal**

- The **Resource Conservation and Recovery Act (RCRA)** created the framework for the proper management of hazardous and nonhazardous solid waste, and it encourages source reduction and recycling. RCRA set national goals for:
  - Protecting human health and the environment from the potential hazards of waste disposal.
  - Conserving energy and natural resources.
  - Reducing the amount of waste generated.
  - Ensuring that wastes are managed in an environmentally-sound manner. [\[2\]](#)
- **Greening the Government through Waste Prevention, Recycling, and Federal Acquisition**, [Executive Order 13101](#). This executive order strengthens and expands the federal government's commitment to recycling and buying recycled-content and environmentally preferable products.

## **PERFORMANCE**

Keeping in mind the "Reduce, Reuse, Recycle" ethic, agencies may support particular waste management strategies because they are considered to protect the environment and serve Californians better than other alternatives. These strategies for example, can reclaim recyclables or organic material from waste streams instead of burying or burning them. They can promote programs such as grass cycling, on-site composting, and curbside pick up of green waste, thus preventing this material from ending up in a landfill or transformation facility.

Any arrangement for solid waste services and recycling should meet expectations for environmental and economic performance. By specifically identifying the types of waste diversion programs, the allowed contamination or residual acceptable from collection, transfer, and separation activities; and the facility or facilities to which waste will be delivered, agencies can control their performance and meet California's waste diversion requirements.

Traditional waste management contracts specify services that begin at the dumpster and pay the contractor based on the amount of waste that they haul out for disposal or out to the recycler. This service model fails to result in source reduction since it does not provide any incentive to the contractor to reduce wastes but instead offers to pay them more for increased hauled quantities.

One emerging environmentally preferable procurement methodology for garbage and recycling contracts is to transform them from garbage and recycling contracts into "resource management" (RM) contracts, a term coined by a large company in a United States Environmental Protection Agency (USEPA) WasteWise pilot study with the Tellus Institute.

The company's objective in executing RM contracts was to "provide a systems approach to resource efficiency that motivates cost reduction and conservation of plant resources." [3] RM contracts go beyond service contracting for disposal and recycle hauling saving money and resources.

One of the unique features of RM contracts is that they significantly compensate contractors for their waste minimization efforts performed, decoupling contractor profitability from waste disposal and/or service levels. In an RM contract, total organization-wide waste and recycling costs are "capped" and compensation is tied to waste minimization efforts.

RM includes dispensing performance bonuses based on and financed from demonstrated resource efficiency savings from a documented baseline. This methodology creates contractor incentives since it seeks savings through recycling/diversion and other resource efficiency innovations.

The USEPA [WasteWise Web site](#) provides numerous remarkable pilot results showing how RM contracts have resulted in achieving reduced waste disposal, increased source reduction and recycling quantities, and saving resources and money while appropriately rewarding contractors for their performance.

## **COST**

One way to reduce costs for garbage and recycling services is by structuring the contract as an RM contract or setting an internal policy to cap waste disposal and recycling costs and using in-house staff to continuously devise a waste reduction program.

Clearly, costs can be continuously reduced when methods, practices, and policies work in concert to reduce waste generation at a facility. Likewise, costs may be significantly reduced by using in-house expertise to:

- Evaluate waste streams and devise methods to separate out recyclables since these wasted resources have the potential to generate revenue. Costs can be neutralized by realizing that some of the wastes being managed may have resource value that may be able to generate revenue. Recycling markets for different waste types should be reviewed to find revenue generating opportunities.
- Evaluate and improve the logistics of the transfer and processing of generated waste to final disposition. The feasibility of alternatives to potentially costly collection, movement, or processing steps for wastes should be considered prior to drafting a request for proposal (RFP) or a garbage and recycling contract.

Comprehensive garbage and recycling contracts should manage waste according to an agency's [AB 75](#) solid waste plan to avoid possible steep penalties from failing to comply with these mandates. Garbage and recycling contracts should aim to achieve the least billed costs for disposal. Seeking out strong

legitimate markets for recyclables is desired to generate maximum revenue and to increase resource recycling and recovery.

If there is a cheaper disposal alternative available, it may not be the most environmentally friendly. Closer analysis may show that any short-term savings may not be worth the implementation costs, potential liabilities, and costly court proceedings that could result from choosing a different disposal option just because it looks cheaper.

The cost of reusing, recycling, or composting various materials may or may not be less than disposing of them as garbage. It depends on many factors, including:

- Materials chosen for recycling;
- Location of material in association to recycler (transportation cost);
- Percentage of the waste stream that is recyclable;
- Volume that is available for collection;
- How materials are separated or aggregated for pick-up; and
- Value of any particular material as a commodity to recyclers (market value).

Any additional costs should be considered in light of reductions in the cost for waste disposal service and the requirement in California law to divert at least 50 percent of total generated waste.

Eliminating or minimizing specialty management activities is another way extraordinary costs may be avoided. For example, specialty management that requires skilled labor and special insurance protections may add costs. Secure shredding and destruction services for documents are one example. These services are labor intensive and require skilled oversight and equipment after it leaves the facility door.

The feasibility of alternatives to potentially costly collection, movement, or processing steps for wastes should be considered prior to drafting an RFP or a garbage and recycling contract. For example, discussions with a team of representatives from the facility should be conducted wherever possible to determine if shredding of documents can be done on-site by the waste generators or their departments; and recyclers should be consulted to see if they will accept paper that is shredded by the waste generators.

Costs can be greatly reduced through subscribing to principles of economy of scale wherever possible. Reduced costs can be achieved when larger quantities are moved. Check with your facilities, operations, landscape, and janitorial representatives to determine if there is square footage space available at your facility to accumulatively store, process, and consolidate different waste types such that larger quantities may be moved or sold to reduce costs or earn more.

To reduce costs, also determine if other State agencies, sister organizations, or partners located nearby may be interested in jointly storing, processing, and consolidating wastes together at a location in an effort to accumulate greater quantities before moving the wastes or recyclables.

Costs can also be neutralized by procuring products that generate recycling revenues compared to those that have no markets. As a result, it's useful to identify wastes that have no markets and design these wastes out of the system by procuring alternative products.

## **SPECIFICATIONS**

### **Tips for Writing Specifications**

Waste and recycling contracts should aim to meet or exceed the goals of a State organization's [AB 75](#) integrated waste management plan. In addition, remember to contact the solid waste management office

of the local jurisdiction in which your organization generates waste to learn about the requirements of the jurisdiction's waste management plan.

To develop the contract specifications, the following steps are recommended:

***Consider a Resource Management Contract***

If the facility contract is a traditional contract that is structured to provide hauling and disposal services and hauling and recycling services from the facility dumpsters, consider transforming the scope of the contract to a resource management (RM) contract that will include the following:

1. Capping of disposal.
2. Reducing waste generation through preventative upstream measures.
3. Increasing recycling and recovery rates.
4. Providing waste and cost reduction initiatives.
5. Providing a tracking, reporting, and invoicing system.

***Specify a Phased Approach***

Specify Phase I to begin after the start date. Specify Phase I to be the period of time where relationships are established and baseline data are compiled.

1. Establish and form a "Team" of technical support persons to aid in writing the contract and the request for proposal. Select persons from facilities management, food management, janitorial services, and landscape management.
2. Document a baseline. Facilities change operations and improve their waste management operations over time; it is essential that up-to-date information is compiled to serve as a baseline for Phase II. Work with the Team to provide the following key information:
  - a. A comprehensive list of waste types generated and their locations of generation in the facility to be serviced. In particular, identify all generated sources of food wastes, putrescible, and yard waste.
  - b. Identify the approximate rate of generation of each of the identified waste types per week or month.
  - c. Identify the existing storage capacity for these wastes on site.
  - d. Identify all existing on-site locations and types of processing and consolidation that occur.
  - e. Survey the facility and determine if there are any new storage, processing, or consolidation areas available.
  - f. Identify all on-site waste accumulation, processing, or consolidation constraints (i.e., odor, noise, dust, fire hazard, code, etc.)
  - g. Identify if there are any sister organizations or other state agencies nearby that may be interested in co-location or shared service agreements.
  - h. For each waste type, determine if there is any on-site or off-site reuse occurring; document barriers, and look for opportunities that can generate revenues or save these wastes from disposal.
  - i. For each material type generated, estimate the amount that is separated out by on-site practices (i.e., employees separating materials out into bins, on-site materials recovery facility (MRF), and transferred off-site for recycling or recovery. Identify opportunities where this can be increased by policy and by adding on-site waste separation processing steps or infrastructure.
3. Specify that an action plan be developed for Phase II to reduce waste generation through preventative upstream measures, increase recycling and recovery rates, provide waste and cost reduction initiatives, and provide a tracking, reporting, and invoicing system for data management.
  - a. In particular, work with the Team to determine and consider what sort of policy and added infrastructure (i.e., bins, staff to manage, etc.) are needed for the facility to separate out generated organic wastes (i.e., food, yard, residual paper). Priority should be placed on

this step to 1) eliminate contamination of other wastes to improve reuse and recycling resource quality, and 2) to avoid disposal of the organics to increase diversion quantities significantly. The CIWMB commercial waste generation database indicates that organics can make up as much as 40 percent of some commercial business wastes.

#### 4. RM Financial Proposals

- a. Specify that waste management services be provided **on a budget neutral basis** (i.e., at a cost not exceeding that currently paid for waste and recycling services, adjusted for any facility-driven changes in waste volumes) and that recycling and waste reduction services be provided as **value-added services at no additional charge**. Expenses incurred in the provision of these services must be covered by waste/recycling hauling services, recycling revenues and/or overall program savings (avoided hauling costs, avoided disposal costs, avoided taxes, commodity revenue). The financial proposals shall consist of two components: 1) costs of existing services provided including the costs of hauling and processing waste, costs of hauling and processing recyclables, revenues or costs for recyclables and 2) the incentive structure including any plans for gain-sharing with the facility.

#### ***Traditional Waste Disposal Contracts***

Waste disposal contracts should specify these items:

- Identify where waste will be delivered for final disposal (Note: transfer stations are not final disposal facilities);
- Require that the hauler will provide written disclosure of where waste will be delivered.
- Require that, upon request, the hauler will provide documentation of final disposition of all waste, such as weight tickets.

#### ***Traditional Recycling Contracts***

When arranging for recycling and composting services, consider the following specifications:

- [Consider incentives that will increase diversion rates.](#)
  - Decouple contractor profitability from waste disposal and/or service levels by "capping" total organization-wide waste and recycling costs, then tying compensation to waste minimization.
  - Performance bonuses based on and financed from demonstrated resource efficiency savings from documented baseline. Contractor incentive: Seek savings through recycling/diversion and other resource efficiency innovations. Performance bonus based on resource efficiency dollars saved.
- Consider if reuse, recycling, and waste management collection, pre-processing, and consolidation services can be more cost effectively added through janitorial services.
- Consider the following provisions:
  - Consider how often off-site transfer is needed.
  - Consider if on-site space is available for shredding confidential documents on-site instead of processing through special confidential document services. Determine if recyclers will accept paper that is shredded by the generator.
  - Consider implementing installation of equipment to consolidate or separate wastes on-site.
  - Consider the feasibility of collecting compostable materials separate from other garbage and recyclables into on-site compostable bins for transfer since compostable may account for up to 40 percent of some waste streams.
  - Consider the feasibility of collecting white ledger paper since there is increased market value for this commodity compared to mixed paper.
  - Consider special site specific provisions to avoid site specific generated hazardous substances from entering solid waste streams.



- Identify specific materials that are generated at the facility and that will be collected.
- Require that the vendor report the volume of materials collected for recycling.
- If the materials generated are not source separated, then identify an acceptable residual or contamination rate for processing at the materials recovery facility (MRF) in the contract and require the vendor to provide periodic reporting of the residual or contamination rate for material separation.
- Require that the vendor provide proof of recycling by reporting where the materials are delivered.
- Require that a certificate of destruction be provided for recycling of confidential documents.
- Require that, upon request, the recycler will provide documentation of final disposition of material, such as weight tickets and verification of domestic or international markets.

### **Sample Requests for Proposals, Specifications, and Contracts**

**Independent School District 196, Minnesota.** [Request for Proposal](#) (RFP): Services for Resource Management.

**Lansing School District, Lansing, Michigan.** [Request for Proposal](#) to provide: Chemical and Resource Management Services (CRMS).

**Lemuel Shattuck Hospital, Jamaica Plain, Massachusetts.** [Request for Response](#) (RFR): Resource Management Services for Lemuel Shattuck Hospital.

**City of Palo Alto, California. Public Works Department, Operations Division.** Request for Proposal (RFP) Number 113497 for Professional Services, Title: Provision of Services for "Getting to Zero Waste" Program.

**County of Santa Clara, California.** [Request for Proposal # B2595](#) -- Garbage, Recyclables and Compostables Collection from County Facilities.

**West Des Moines Community School District, West Des Moines, Iowa.** [Request for Proposal](#) (RFP): Services for Resource Management.

## **VENDORS**

The CIWMB administers several [contracts](#) for the collection of specific recyclable materials for certain geographic areas. These contracts have been set up by the CIWMB and are ready to use, thereby saving your agency the trouble of development and implementation.

## **SUCCESS STORIES**

### **California**

#### **Local Government**

Reducing our waste requires the combined efforts of government, business, and the public. The progress made in a few short years has been remarkable, with California reaching a statewide average diversion rate of 48 percent in 2002. This achievement would not have been possible without the tremendous efforts on the part of local governments all over California to provide a wide range of exciting and successful waste reduction programs in their communities. To read about some of the outstanding California success stories, visit the CIWMB's [Trash Cutters](#) Web page.

#### **State Agencies**



The [State Agency Recycling Recognition \(STARR\) Awards program](#) was offered through the interim goal year of 2002 by the California Legislature and the CIWMB. The awards recognized hard work and shared successes with other agencies/facilities that may benefit from the experiences of others.

#### **Other**

The USEPA's WasteWise Program conducted a number of pilot studies using resource management (RM) contracts. RM has been piloted in many places. One year after implementing RM contracts at several of its North American plants, a large company realized a 20 percent reduction in overall waste generation (30,000 tons), a 65 percent increase in recycling (from 50,000 tons to more than 82,000 tons), and a 15 percent to 30 percent decrease in waste management costs.

## **RESOURCES AND WEBSITES**

### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

- The CIWMB assists state agencies and facilities to reduce the amount of waste they generate and dispose of by implementing waste prevention, reuse, and recycling programs. For more information, contact the [State Agency Assistance section](#).
- The **Office of Local Assistance (OLA)** helps local governments meet the planning and diversion mandates of the [Integrated Waste Management Act](#). Visit the CIWMB's Web site for [contact](#) information.
- **Solid Waste Information System (SWIS)**. The CIWMB maintains the SWIS database, which contains information on solid waste facilities, operations, and disposal sites throughout the state of California. The types of facilities found in this database include landfills, transfer stations, material recovery facilities, composting sites, transformation facilities, waste tire sites, and closed disposal sites. For each facility, the database contains information about location, owner, operator, facility type, regulatory and operational status, authorized waste types, local enforcement agency and inspection and enforcement records. The facility database is continuously updated.

### **Massachusetts, Commonwealth of Department of Environmental Protection (DEP)**

Boston, MA

(617) 292-5500

The following resources are available on the DEP's Web site:

- [Advancing Resource Management Contracting in Massachusetts: Reinventing Waste Contracts and Services](#). Prepared by the Tellus Institute for the Bureau of Waste Prevention of the Massachusetts Department of Environmental Protection.
- [Resource Management Contracting Web Site](#)

### **United States Environmental Protection Agency (USEPA)**

Washington, DC

(202) 272-0167

The following resources are available on the USEPA's Web site:

- Paul Ligon and Tom Votta, "Strategic Contracting Increases Waste Prevention and Materials Recycling," *Resource Recycling*, March 2001.
- *WasteWise Resource Management: Innovative Solid Waste Contracting Methods* (see "Resources" heading).
- *WasteWise Update -- Resource Management: Strategic Partnerships for Resource Efficiency*

[1] State of California. Department of Toxic Substances Control. Final Regulations: Universal Waste Rule Web page. Available at [http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/UWR\\_regs.cfm](http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/UWR_regs.cfm). Accessed on May 5, 2006.

[2] United States Environmental Protection Agency. Wastes - Laws and Regulations Web page. Available at <http://www.epa.gov/epaoswer/osw/laws-reg.htm>. Accessed on May 5, 2006.

[3] United States Environmental Protection Agency. WasteWise - What is Resource Management Web page. Available at <http://www.epa.gov/wastewise/wrr/rm.htm>. Accessed on May 5, 2006

## BM - Lighting and Occupancy Sensors

### Environmental and Health Issues and Recommendations



#### Conserves Energy:

Using occupancy sensors can reduce energy use by as much as 45 percent. Improving energy efficiency can reduce emissions that contribute to global warming, mercury contamination in lakes, acid rain, and nuclear waste.



#### End-of-Life Management:

The life cycle cost of fluorescent lamps should include the cost of managing spent fluorescent lamps as hazardous waste under the [Universal Waste](#) program of the California Department of Toxic Substances Control.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
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- [Cost](#)
- [Specifications](#)
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### BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

With lighting typically accounting for 30 percent to 50 percent of energy use in most buildings, finding ways to increase lighting efficiency can result in significant savings. Even in existing buildings, there are several options for reducing energy use, including:

- Making good use of natural daylight.
- Installing energy-efficient lights.
- Using timers and sensors to control when lights are turned off and on.

Some lighting products may be considered hazardous waste when the products are disposed. California's Environmental Protection Agency (Cal/EPA) and Department of Toxic Substances Control (DTSC) encourage the recycling of these hazardous wastes under the [California Universal Waste Rule](#) (UWR) with the intent to reduce the amount of hazardous waste (mercury, lead, and cadmium) entering the municipal waste stream. "Universal wastes are hazardous wastes that are more common and pose a lower risk to people and the environment than other hazardous wastes." <sup>[1]</sup> The UWR includes waste lamps such as fluorescent tubes, high intensity discharge lamps, sodium vapor lamps, and any other lamps that exhibit a characteristic of a hazardous waste.

## LAWS AND GUIDELINES

### **California Regulations**

- Regulated parties may manage their lamps per the streamlined provisions of the California [Universal Waste Rule](#) (UWR - Title 22, California Code of Regulations), if their wastes are sent to a recycling facility.
- A bill of lading and common carrier can be used to transport intact lamps to a recycling facility.

### **Policy**

[Management Memo 05-16](#), provides guidance for the proper management of fluorescent lamps by State agencies within California.

The California [UWR](#) mandates that State agencies must recycle fluorescent lamps in order to manage them as Universal Waste. If not recycled, fluorescent lamps must be managed as fully regulated hazardous waste.

### **Federal**

Under federal Executive Order 13212, federal agencies shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.

## PERFORMANCE

### **Occupancy Sensors**

Occupancy sensors reduce energy waste by taking over light switch chores. Sensors turn the lights on when they sense someone coming into a room or area, and then turn the lights off some time after sensing the room is empty. These sensors are best suited in spaces that are used infrequently or unpredictably, such as conference rooms, private offices, classrooms, storage areas, and bathrooms. Sensors can be mounted on the wall just like a light switch or installed in the ceiling.

Generally speaking, there are three types of sensors: motion-detecting (ultrasonic and microwave), heat-sensing (infrared), and sound-sensing. The area to be lit and the types of surfaces in the space will determine which sensor is most effective.

### **Energy-Efficient Lights**

Fluorescent lights are probably the most popular indoor light source because they last longer and cost about 50 percent less to run than incandescent lights.

High-intensity discharge (HID) lights are also extremely energy efficient, provide high light output, and have an extremely long life. Typical examples of HID lights are high pressure sodium lamps and metal halide lamps. Traditionally, these lights were available only in high wattages and primarily for outdoor

applications. Now a number of new, lower-wattage lamps make HIDs suitable for indoor applications as well.

### **Exit Signs**

Exit signs that have earned the federal government's [ENERGY STAR](#) rating operate on five watts or less per sign, compared to standard signs, which use as much as 40 watts per sign. Exit signs that have earned the ENERGY STAR rating are tested for visibility factors, and come with a five-year manufacturer warranty.<sup>[2]</sup>

### **Daylighting**

Drawing more daylight into a building reduces dependency on artificial lighting and helps support worker productivity. When designing or renovating a building, the key is to bring the daylight into an elevated location, such as through skylights. Another important factor is providing a method to bounce the daylight off surrounding surfaces - such as light shelves - so that light is distributed throughout the building's interior.

Additional engineering and installation costs may be necessary to implement some of the daylighting measures. These costs are typically offset by the reduced cost associated with minimizing the use of artificial lighting.

## **AVAILABILITY**

All of these options are readily available from local and regional suppliers and lighting specialists. See also the [Vendors](#) section for information regarding the California Lamp Contract for higher efficiency, lower mercury fluorescent lamps.

## **COST**

***Note: The following discussion on cost is general and is not meant to reflect specific contracts or to supersede existing mandates or policies.***

While it may be ideal to change a lighting system when remodeling or constructing a building, moving to sensors and energy-efficient lighting can still be done cost-effectively at any time. Making changes even more economical, electric utilities often offer incentives for installing occupancy sensors and other more efficient lighting and control technologies.

### **Occupancy Sensors**

When people are unlikely to remember to turn lights off, an occupancy sensor is a great way to save money. Depending on wattage, size of area to be sensed, and other features, the cost can range from \$50 to \$150 per unit. Photocells, which are sensors used to help compensate for fluctuations in daylight, cost an average of \$10 to \$50. Although cost varies by the type of sensors used, sensors can usually pay for themselves through energy savings within two to three years.

### **Energy-Efficient Lighting**

Typically, improving lighting efficiency involves a trade-off: replacing inexpensive and less-efficient lamps with those that cost more up front, yet are more efficient. In the long run, higher energy efficiency will result in cost savings. In addition, several electric utilities offer cash rebates for purchasing energy efficient lighting.

Remember that fluorescent and HID lamps should be managed as [universal wastes](#); however, the savings from energy efficiency gains well exceed the cost of recycling the lamps.

### **ENERGY STAR Exit Signs**

"When installed throughout a building, qualified exit signs can save hundreds or even thousands of dollars in energy and maintenance costs. One sign alone can save about \$10 annually on electricity costs and can last up to 10 years without lamp replacement, compared to less than one year for an incandescent sign.[\[3\]](#)

## **SPECIFICATIONS**

### **California**

Specifications are available in the State's contract for higher efficiency, lower mercury fluorescent lamps - California Lamp Contract # 1-06-62-31. Recycling services are also available through this contract.

### **Tips for Writing Specifications**

#### ***Sample Language***

Work with vendors to determine the type of occupancy sensor that best meets your needs. To purchase the appropriate occupancy sensors for specific applications, consider these issues:

- The design and surroundings of the space in which the sensors are being installed, especially the existence of obstructions and outside sounds;
- Compatibility with the lighting systems that the sensors will control; and
- Ability to manually override the sensors or to adjust the time-delay period.

## **VENDORS**

### **California**

Higher efficiency, lower mercury fluorescent lamps are available through California Lamp Contract # 1-06-62-31. Recycling services are also available through this contract.

### **Other**

#### ***Lamps and Fixtures***

Consult any local lighting contractor or your local utility for energy-efficient lamp and fixture options. Check in the Yellow Pages under "Energy Conservation Products and Services" or "Lighting Consultants."

The [ENERGY STAR](#) program, a voluntary public-private sector partnership program established by the United States Environmental Protection Agency (USEPA) and the United States Department of Energy, maintains the online ENERGY STAR Purchasing Tool Kit which lists businesses that manufacture or distribute energy-efficient lighting. Product specification guidelines are also available.

#### ***Lamp Recyclers***

A listing of lamp recyclers is available from [Lamp recycle.org](http://lamprecycle.org). State of California facilities that generate fluorescent lamps must contact a lamp recycler and develop a program based on a pre-determined frequency for disposal.

Locate local collection facilities across the country by searching the [Earth 911](#) Web site.

## **SUCCESS STORIES**

### **Capitol Area East End Complex, Sacramento, California**

Information on the environmentally preferable lighting used in the State of California's Capitol Area East End Complex is available online.

## RESOURCES AND WEBSITES

### [California Department of Toxic Substances Control \(DTSC\)](#)

Public and Business Liaisons

(800) 728-6942

The DTSC's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. More than 1,000 scientists, engineers and specialized support staff work in [ten locations](#) statewide. See the DTSC's [Universal Waste](#) Web page for information on managing fluorescent lamps and tubes.

### [California Integrated Waste Management Board \(CIWMB\)](#)

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Information regarding environmentally preferable lighting options is available throughout the [CIWMB's Sustainable Building](#) Web pages. See also the CIWMB's Waste Prevention Information Exchange Fluorescent Lamps and Tubes Web page.

### [ENERGY STAR](#)

Washington, DC

(800) STAR-YES (800-782-7937)

ENERGY STAR is a voluntary public-private sector partnership program established by the United States Environmental Protection Agency and the United States Department of Energy to promote energy conservation and efficiency. The Web site provides information on energy-efficient lighting, product specification guidelines, and [lists of ENERGY STAR products](#).

### [Green Seal](#)

Washington, DC

(202) 872-6400

Green Seal is a nationally recognized non-profit organization that certifies a variety of environmental products that pass stringent testing standards. Download its most recent standard for occupancy sensors which establishes environmental and performance requirements for certain sensors and switching devices. See also the following "Choose Green" reports:

- Occupancy Sensors (February 1997)
- Linear Fluorescent Luminaires (September - October 2000)
- Energy-Efficient CFL Downlight Luminaires (November - December 2000)

For more information on environmental purchasing and services offered, see the Greening Your Government Program Web page.

### [ABAG Energy Watch](#)

Oakland, CA

The Association of Bay Area Governments' Energy Watch Partnership provides technical assistance and information services to assist small to medium-sized cities, counties, and special districts in the program's service area to complete energy efficiency projects in public facilities and to promote energy efficiency within their communities. Contact information is available [on-line](#).

**Minnesota Department of Commerce Energy Information Center**

St. Paul, MN  
(651) 296-5175  
(800) 657-3710

The Energy Information Center offers numerous publications for understanding and improving energy conservation and efficiency, including resources specific to lighting.

**United States Department of Energy**  
**Federal Energy Management Program (FEMP)**

Washington, DC (800) 363-3732

The FEMP was designed to reduce the cost and environmental impact of Federal agencies by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at Federal sites. The FEMP provides a variety of resources to help any purchaser more readily identify energy compliant (ENERGY STAR) products and find ways to save money, energy and natural resources in the office. See the following FEMP resources:

- [Energy Efficiency Recommendations](#) for lighting technologies
- [Energy Cost Calculator](#) for compact fluorescent lamps
- ["Greening Federal Facilities"](#) (Section 5.4 - Lighting)

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[1] California Department of Toxic Substances Control. Managing Universal Waste in California fact sheet. June 2003. Available at [http://www.dtsc.ca.gov/HazardousWaste/EWaste/upload/HWM\\_FS\\_UWR.pdf](http://www.dtsc.ca.gov/HazardousWaste/EWaste/upload/HWM_FS_UWR.pdf).

[2] United States Environmental Protection Agency and United States Department of Energy. ENERGY STAR Exit Signs Web page. Available at [http://www.energystar.gov/index.cfm?c=exit\\_signs.pr\\_exit\\_signs](http://www.energystar.gov/index.cfm?c=exit_signs.pr_exit_signs).

[3] Ibid.

## **BM - Paint**

### **Environmental and Health Issues and Recommendations**



#### **Prevents Waste:**

Buying the right amount of paint saves money and reduces leftover paint. If any paint becomes leftover, store it properly and use it later.



#### **Recycled Content:**

An estimated two million gallons of leftover paint are collected in California each year. [1] There are two types of recycled paint: reprocessed and rebled. Reprocessed paints are high-quality and generally tested to meet the same standards as virgin paints, [2] while rebled paints are consolidated leftover paints. Purchase recycled-content paints to support a market for leftover paint collected through local recycling programs. Buy recycled-content paints with a minimum content of 50 percent postconsumer content.





#### [Air Quality:](#)

Many paints contain high levels of volatile organic compounds (VOCs). Look for zero-VOC or low-VOC paints, which are most often water-based. (All architectural coatings sold in California are required to have the VOC content on the container.)

Paint can contain a variety of compounds hazardous to health including carcinogens and irritants. Paint odors can be annoying to building occupants and can be accompanied by eye, nose, throat, and respiratory irritation. Examine the Material Safety Data Sheet (MSDS) to learn about names of all ingredients in the paint that have been determined to be health hazards. Note that ingredients less than 1 percent, and carcinogens less than 0.1 percent of the paint composition are not required to be listed.



#### [Less Hazardous:](#)

Avoid paints containing heavy metals and other hazards that can cause health risks. Favor latex over oil-based paints, which generate hazardous clean-up wastes.



#### **End-of-Life Management:**

Buy only the amount of paint needed for the job to avoid managing leftover paint. Store any leftover paint properly for future use. If leftover paint cannot be re-used in the next few years before its quality degrades, it should be donated for re-use and recycled properly by taking it to a hazardous waste consolidation facility or by contracting with a licensed hazardous waste hauler to pick it up (in California, leftover paint destined for disposal becomes a hazardous waste that cannot be disposed of in landfills; therefore, it must be reused, reprocessed, or recycled into a usable product). Contact [Earth 911](#) for a local recycler.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Prevents Waste](#)
  - [Recycled Content](#)
  - [Air Quality](#)
  - [Less Hazardous](#)
- [Laws and Guidelines](#)
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## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

All environmentally preferable paints referred to in this guide are waterborne, or water-based, latex paints. Oil-based paints (also known as solvent-based paints, or alkyd paints) are not recommended, because they are not available in low-volatile organic compound (VOC) blends, less toxic formulations, or recycled-

content paints. At this time, no North American plant will recycle oil-based paint into recycled paint. All of the collected oil-based paint is blended with fuels and burned for its combustion energy value. Therefore, all references to paint in this guide refer to latex paints unless otherwise specified.

Californians purchase approximately 100 million gallons of paint and other coatings each year. [\[3\]](#)

Did you know:

- A growing number of paints are made from recycled paint?
- Many paints now contain lower levels of VOCs, which helps to reduce the smells and off-gassing that are commonly associated with fresh paint?
- Less-toxic paints perform well without using heavy metals and other toxic chemicals?

Recycled-content, zero/low-VOC, or less toxic paint is an alternative to traditional paint that offers environmental and health benefits.

### **Recycled Paint**

Purchasing recycled paint is necessary to "close the loop" so that paint collected in recycling programs goes back into a usable commodity. The Product Stewardship Institute estimates that conservatively, at least five percent of all paint sold becomes leftover paint, [\[4\]](#) totaling more than four million gallons of leftover paint each year in California alone. This leftover paint represents a collection challenge if recycled properly, and an environmental risk if disposed improperly. The four million gallons of leftover paint each year are a potential commodity that can be used to make recycled paint; unfortunately, less than half of the leftover paint is properly collected and recycled each year. The uncollected amounts may be improperly disposed of in trash (ending up in landfills), or may be poured down storm drains (harming aquatic life), or may be poured down sinks (interfering with proper wastewater treatment). When paint can't be swapped or used, the highest and best use of the leftover paint is to reblend or reprocess it into recycled paint.

Much of the collected latex paint is currently being blended as an additive to concrete, or is stock-piled in warehouses waiting for purchase. Paint buyers have an opportunity to improve the entire paint recycling infrastructure and collection through the purchase of recycled paint.

## **Environmental and Health Issues**

### ***Prevents Waste***

There are a number of ways to reduce paint waste. Before purchasing paint, measure the area to be painted. Talk with suppliers and read product information to determine the right amount of paint to purchase. Store leftover paint for future use by securing the paint lid tightly (loosely covering a container of paint dries it out) and store in an area that will not allow the paint to freeze (frozen paint becomes unusable).

### ***Recycled Content***

Recycled paint is made from paint collected through public and private collection programs. Collected paints are screened for usability and quality. Virgin materials such as resins and colorants can be added, and the products may be tested before packaging and resale. Recycled paint contains 20 percent to 100 percent postconsumer content.

There are two types of recycled-content paint: reprocessed and rebled. Although both types originate from the collection of leftover latex paint, there are important differences.

**Reprocessed paint**, also called remanufactured paint, is mixed with virgin materials such as resins and colorants, and is then tested, generally by the same tests as those done on virgin paints, before packaging for resale. [5] Reprocessed paint typically contains a minimum of 50 percent postconsumer content.

**Reblended paint**, also called consolidated paint, is re-mixed, screened, and packaged for distribution. Virgin raw materials such as resins and colorants may be added in small quantities. Minimal testing is applied to reblended paint. Typically, reblended paint contains more than 95 percent postconsumer content, with ranges between 75 percent to 100 percent postconsumer content.

**What to look for:** Consider the application to determine which type of recycled paint is appropriate. Look for reprocessed paint if a higher quality product is needed and look for paint labeled or sold as "recycled paint" with at least 50 percent postconsumer content. See [Vendors](#) for sources.

### ***Air Quality***

All oil and many latex-based paints contain organic solvents to disperse and bind other paint components. These organic solvents are the major ingredients that contribute to indoor VOC levels when paints are applied inside a building. Many VOCs in paints are known to cause human health effects, and some VOCs may play a role in the constellation of sick building syndrome (e.g., headaches, fatigue, eye and upper respiratory irritation). [6] There are outdoor and indoor air quality considerations for paint.

### **Indoors**

Californians spend about 87 percent of their time indoors. [7] Pollutants like VOCs that are emitted indoors have many times the likelihood to be inhaled than comparable outdoor emissions. It is important to use paints that contain zero or low-VOCs indoors. Paints that list they are zero-VOC does not mean they contain no VOCs. These paints may still have colorants, biocides and fungicide, and very low levels of VOCs. According to the United States Environmental Protection Agency (U.S. EPA), zero-VOC paints are paints that contain VOCs in the range of five grams/liter or less.

Use of zero-VOC or low-VOC paint may have the added benefit of less objectionable odors and less eye, nose, and respiratory irritation for the painters and building occupants.

### **Outdoors**

In outdoors applications, there are significant findings associated with VOCs from paint contributing to the formation of ground-level ozone and photochemical smog, which have harmful effects on human health. In response to such concerns, more government agencies are acting to limit VOC levels in common products such as architectural paints.

California air emission requirements affect more than 90 percent of paints in use, and have led the industry to develop low-VOC coatings. The most stringent standards have been developed by the South Coast Air Quality Management District (SCAQMD) as regulated by [Architectural Coatings Rule 1113](#) (summarized below). [8] These limits are based on reducing ozone formation in the outside air and not on health considerations for indoor air.

**Figure 1: Allowable VOC levels (grams/liter less water and exempt compounds) South Coast Air Quality Management District - Partial Coatings List** (see [complete list on pages](#)

9-10)	
Paint Type	VOC limit (grams/liter)
Flat	100 (limit of 50 beginning July 2008)
Non-Flat	150 (limit of 50 beginning July 2006)
Primers, Sealers, & Undercoaters	200 (limit of 100 beginning July 2006)
Quick-dry Enamels	250 (limit of 150 proposed beginning July 2006 and 50 proposed beginning July 2007) <a href="#">[9]</a>

**VOCs in Recycled Paint.** Testing suggests that recycled paints do not exceed VOC limits established for virgin paints. A California Polytechnic State University (Cal Poly) study reported that reprocessed recycled latex paints tested for VOC levels show a range between 100 and 170 grams/liter, [\[10\]](#) and [MetroPaint lab results](#) found that rebleded recycled latex paints range from 30 to 100 grams/liter VOCs. [\[11\]](#) Emissions from recycled paints are affected by the emissions in the feedstock paints, which suggest that the level will likely change from batch to batch. However, if the overall supply of paint has fewer emissions, it can be expected that recycled paints made from this feedstock will also have lower emissions.

**What to look for:** Look for paint labeled or sold as "Low-VOC paint." Look for paints that have 50 grams/liter VOCs or less; or meet the [SCAQMD requirements](#) for VOCs. If paint ingredients are not clearly listed on the paint container, ask the vendor for a Material Safety Data Sheet (MSDS). Most paint products now have an MSDS available on the manufacturer's Web site.

Use of low-VOC paint may have the added benefit of less objectionable odors and less eye, nose, and respiratory irritation for the painters and building occupants. See [Vendors](#) for sources.

### **Less Hazardous**

Concerns have arisen about health risks due to the severe effects of several heavy metals traditionally added to paint, including antimony, cadmium, hexavalent chromium, lead, and mercury. The use of lead in paints was phased out beginning in 1978, and the use of mercury in most paints was phased out beginning in the early 1990s (small amounts of mercury may still be found in specialty paints - call the paint manufacturer and ask as the product information may not be required to disclose this).

Many other chemicals - including formaldehyde, benzene, toluene, and methylene chloride - can be present in paint and pose health risks to paint users and occupants of buildings. Formaldehyde, often added to paint as a preservative, is a known human carcinogen and respiratory irritant. Other organic solvents used in paint can be carcinogenic as well. The MSDS from the distributor provides important information on ingredients in the paint that are health hazards. However, it is only required to disclose chemicals in the paint that are more than 1 percent for non-carcinogens, and more than 0.1 percent for carcinogens. Exposure to chemicals present in paints that are below the mentioned non-disclosure levels can cause health effects depending on various factors such as the type of chemical(s) exposed to, exposure conditions, sensitivity of the exposed population, etc. Growing interest in worker and occupant safety has led to an increasing number of safer paint choices.

Generally, water-based latex paints contain fewer solvents and toxic materials than oil-based paints.

What to look for: Look for product information on latex paints showing the ingredients - avoid paints with the solvents and heavy metals listed above. Avoid oil-based paints. See [Vendors](#) for sources.

## **LAWS AND GUIDELINES**

### **California**

#### **Statute**

##### **State Agency Buy Recycled Campaign (SABRC)**

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) sections 12203 and 12209](#) require State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on paint be spent on recycled paint with a recycled content consisting of at least 50 percent postconsumer paint. Preconsumer or secondary paint does not qualify as "recycled paint." If paint containing 50 percent postconsumer content is unavailable, or is restricted by a local air quality management district, a state agency may substitute paint with at least 10 percent postconsumer content.
  - The SABRC paint category, includes, but is not limited to, water-based paint, graffiti abatement paint, interior and exterior paint, and maintenance paint (see [PCC section 12207](#)).
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires paint purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

#### **Executive Order**

California's Green Building Executive Order ([Executive Order S-20-04](#)) established the State's priority for energy and resource efficient high performance buildings. It directs the State to commit to aggressive action to reduce State building electricity usage by retrofitting, building, and operating the most energy and resource efficient buildings by taking all cost-effective measures described in the [Green Building Action Plan](#) for facilities owned, funded or leased by the State. Cities, counties, schools, and commercial building owners and operators are encouraged to do the same.

One significant measure that is mentioned in this Order is for the State to design, construct, and operate all new and renovated State-owned facilities paid for with State funds as "LEED Silver" or higher certified buildings. LEED - the [U.S. Green Building Council's](#) Leadership in Energy and Environmental Design Green Building Rating System® - is the nation's leading green building rating system. It promotes "high performance" building practices; energy, water and materials conservation; environmentally preferable products and practices; improvements in employee health, comfort and productivity; and reductions in facility operation costs and environmental impacts. LEED gives Green Building credit for paints that meet the VOC and chemical component limits of Green Seal requirements. [\[12\]](#)

### **Federal**

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the U.S. EPA in the [Comprehensive Procurement Guidelines](#) (CPG). Latex paint is a U.S. EPA-designated item. Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. Agencies that spend more than \$10,000 per year on a product designated in the CPG, are required to purchase it with the highest recycled-content level practicable. [13] This means that the recycled-content ranges recommended in the U.S. EPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [14],[15] The U.S. EPA's [recommended recovered materials content levels](#) for latex paint are available online.

Executive Order 13101 and the Federal Acquisition Regulation also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [16] See also [U.S. Department of Army's Aberdeen Proving Ground](#).

## PERFORMANCE

### Recycled Paint

Generally, reprocessed recycled paints perform similarly to virgin paints, as shown in several studies described below.

#### California Polytechnic State University (Cal Poly) Study

In California, a three-year study was conducted by California Polytechnic State University (Cal Poly) to evaluate recyclable and recycled (reprocessed) latex paint. The study was done in conjunction with the California Department of Toxic Substances Control (DTSC) and California Integrated Waste Management Board (CIWMB). Researchers collected 61 samples in seven different locations. The study found that in meeting performance and durability specifications, recycled paint ranges from good quality to high quality. The study noted "the spreading rate, durability, and hide - how well the product conceals a surface - are generally equal to virgin paint products."

The recycled paint was also tested for presence of toxic materials. None of the samples exceeded California standards for VOCs. Samples also were well below maximum limits for heavy metals (arsenic, barium, beryllium, cadmium, cobalt, chromium, copper, mercury, molybdenum, nickel, lead, selenium, thallium, vanadium, and zinc), with the exception of a single sample that exceeded the maximum mercury level of 200 parts per million. More information is available in the [complete Cal Poly report](#).

#### California Fairs and Exhibitions Field Study

Another large scale project testing the performance of reprocessed recycled latex paint began in the summer of 2001 when the CIWMB funded a grant to paint buildings at 12 different fairgrounds throughout California. [17] A total of 4,920 gallons of 75 percent postconsumer content recycled paint were purchased and used to paint 92 different structures, including interiors and exteriors of office buildings, exhibit buildings, barns, and grandstands. Approximately 90 percent of the fair operators stated that the overall paint quality was good, and while the true success of the program will be seen in the endurance of the paint, initial results were positive. The paint was made readily available by direct shipment to the sites, and cost of the recycled paint was only 63 percent of comparable virgin paints.

#### Connecticut Field Study

In 1997, the U.S. EPA, Waste Watch Center (WWC) of Haverhill, Massachusetts, and the Connecticut Department of Environmental Protection (DEP) conducted a demonstration program for recycled-content paint. The purpose of the program was to determine if recycled-content latex paint could meet basic



performance standards for application wear and tear. Nine sites were selected, and various buildings were painted with a 50 percent minimum postconsumer recycled-content latex paint. Four years later, painted buildings were examined to see how well the paint performed in "real world" conditions. Results were very positive, with eight of nine sites indicating that the paint performed well, and study participants indicating they would be willing to use recycled paint again in the future. [\[18\]](#)

### **MetroPaint™ of Portland, Oregon**

Although traditionally used for lower-performance coverage such as graffiti abatement, [MetroPaint™](#) of Portland, Oregon carefully selects paints to incorporate in its 100 percent rebled paint. Test results on samples taken from 1993 to 2000 indicated the rebled paint performed comparably with virgin paints. [\[19\]](#) Furthermore, [MetroPaint doubled its production capacity](#) in 2005 and the paint receives good reviews.

### **Performance Conclusions**

- **Reprocessed paint** is a high-grade recycled paint tested to meet performance and durability specifications. This product is used on various types of surfaces, from gypsum wallboard to concrete. The spreading rate, hide, and durability are generally equal to those of virgin paint.
- **Rebled paint** is considered a "good grade" to "high grade" paint. Color, hide, viscosity and quality vary by batch. Minimal testing is performed. Check with the vendor for information on custom tinting and type of tests performed on recycled paint.

### **Air Quality (Low-VOC Paints) and Less Hazardous Paints**

Zero-VOC, low-VOC and less hazardous paints are manufactured to the same exacting performance standards as any other high-quality paint. More than 70 environmentally friendly paint products have been certified by Green Seal. These paints meet the [Green Seal Environmental Standard for Architectural Coatings \(GS-11\)](#), which establishes minimum criteria for performance standards such as hideability, wearability, and scrubability.

### **AVAILABILITY**

Very low-VOC and less hazardous paints are available through existing State contracts for latex paint and coatings. Additionally, many retail paint stores stock low-VOC and less hazardous paints. Refer to the Green Seal listing of environmentally preferred paints ([download the list of Green Seal Environmentally Preferred Coatings](#)).

Recycled latex paint is also available through vendors listed on the current [State contract for recycled paint](#). Recycled paint is not generally available at most retail paint businesses, but it is worthwhile checking because more businesses are carrying the product. For those businesses that don't carry the paint, asking for the product shows customer demand.

### **COST**

Low-VOC and less hazardous paints have been available through the statewide latex paint contract, [\[20\]](#) Recycled latex paint is generally available at a lower cost than a similar virgin paint. The expired State contract 1-04-80-10 for recycled paint indicated pricing at approximately 60 percent of the cost of similar virgin paint. [\[21\]](#)

### **SPECIFICATIONS**

#### **California**



Recycled latex paint specifications have been identified on the Invitation For Bid for the California Department of General Services (DGS) contract for Paint: Recycled, Latex and Semi-Gloss. Requirements include meeting minimum paint performance standards as set by the American Society of Testing and Materials (ASTM) for dry time, opacity, viscosity, and sag resistance. Heavy metal concentrations for lead, mercury, and cadmium cannot exceed U.S. EPA requirements. The paint must also meet quality assurances for condition in the container and application properties. [\[22\]](#)

Additionally, the [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

## **Other Specifications**

### ***Federal Government***

Commercial Item Description (CID) A-A-3185 (Paint, Latex, Containing Postconsumer Material) is the Federal Procurement Specification for Recycled Latex Paint (A-A-3185 replaced the previous Federal Specification for recycled latex paint, TT-P-2846, in April 2001). [\[23\]](#)

The U.S. EPA Comprehensive Procurement Guidelines recommend procuring agencies refer to General Services Administration (GSA) commercial item A-A-3185 when purchasing recycled latex paint. [\[24\]](#)

A-A-3185 covers latex emulsion paint containing a minimum of 20 percent postconsumer materials. The standard lists prohibited materials, condition in container, color tolerance, accelerated storage, freeze-thaw stability, application properties, odor, dry-through, consistency, VOC content, contrast ratio, alkali resistance, flexibility, scrub resistance, biological growth, total solids, fineness of dispersion, gloss, adhesion, and special marking of "DO NOT FREEZE." Quantitative requirements for each grade and class are specified as are test methods (either ASTM or Federal Standard). Ordering data and bid evaluation information are also given. National Stock Numbers (NSN) have been assigned for all types, classes and grades.

The United States Department of the Army's Aberdeen Proving Ground (APG), as part of its overall pollution prevention strategy, worked with Green Seal to examine its paint purchases and to develop standards "minimizing the adverse environmental impacts associated with the purchase of interior and exterior architectural and anticorrosive paints." The APG Paint Standards are similar to the [Green Seal standards](#) - Environmental Standards for Household Paints (GS-11) and Environmental Standards for Anticorrosive Paints (GC-03). The APG Paint Standards support the Department of Defense (DoD) policy to "...reduce the use of hazardous materials, the generation or release of pollutants, and the adverse effects on human health and the environment caused by DoD activities." [\[25\]](#)

### ***Green Seal***

In 1993, [Green Seal](#), a non-profit organization that certifies environmental products, came out with a standard for paint called "GS-11" that sets criteria for performance characteristics (abrasion resistance, opacity, stain removal), and prohibits or restricts the presence of certain heavy metals and toxic organic substances (VOC levels, aromatic compounds, chemical restrictions, packaging).

[GS-11 standards](#) have since been adopted or adapted for use by many states and federal agencies, and the Leadership in Energy and Environmental Design ([LEED](#)) Green Building Rating System®. Paint styles

include primers, flat, eggshell, enamel, and semi-gloss enamel, enabling consumers to find paint with many environmentally preferable qualities to meet any of their design needs.

The maximum VOC levels allowed by the Green Seal standard are:

Paint Type	Interior	Exterior
Flat	50 g/L	100 g/L
Non-Flat	150 g/L	200 g/L

Since these standards were established in 1993, the availability of zero-VOC and low-VOC paints has increased greatly, but the maximum VOC level allowed by Green Seal has remained unchanged (see the environmental specification Section 01350 and SCAQMD for alternative VOC limits). The complete Green Seal [list of certified products](#) is available online.

The GS-11 paint standard does not require recycled content. However, as of December 2005, Green Seal was in the process of establishing a certification system for recycled paints that will establish standards (similar to their GS-11 standards) to develop a listing of high-quality, environmentally preferable recycled-content paints.

#### **Leadership in Energy and Environmental Design (LEED)**

The [LEED](#) Green Building Rating System® provides minimum performance standards for various sustainable building elements, including paint. LEED gives Green Building credit for paints that meet the VOC and chemical component limits of [Green Seal requirements](#). [26]

#### **GreenGuard Environmental Institute**

The GreenGuard Environmental Institute is an independent, non-profit organization that oversees the GreenGuard Certification Program for low-emitting interior products, including paints (see table below). GreenGuard has allowable emission levels for paints to be used indoors and has a list of paints that meet this standard.

Individual VOCs	<0.1 TLV (Threshold Limit Value)*
Formaldehyde	0.05 ppm (parts per million)
Styrene	0.07 mg/m <sup>3</sup> (milligrams per cubic meter)
Total VOCs	0.5 mg/m <sup>3</sup>
Total aldehydes	0.1 ppm

Listing of measured carcinogens and reproductive toxins as identified by California Proposition 65, the U.S. National Toxicology Program (NTP), and the International Agency on Research on Cancer (IARC) must be provided.

Any pollutant regulated as a primary or secondary outdoor air pollutant must meet a concentration that will not generate an air concentration greater than that promulgated by the National Ambient Air Quality Standard (U.S. EPA, code of Federal Regulations, Title 40, Part 50).

\* Any pollutant not listed must produce an air concentration level no greater than 1/10 the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, Cincinnati, Ohio 45211-4438).

### ***Master Painters Institute***

The [Master Painters Institute](#) (MPI) is a nationally recognized organization that develops standards and specifications for the performance and the application of architectural coatings. The MPI has been testing and qualifying products for their Approved Products List since 1967. In 2008, the MPI developed a Green Performance™ Standard (GPS-1-08) and (GPS-2-08) for environmentally preferable paints and coatings that also meet minimum performance standards. The MPI maintains a [listing of products](#) that meet GPS-1-08.

The MPI Green Performance™ Standard states, "As to recycled paints, there are at least two concerns. The first concern is that the waste stream **must be verifiably environmentally preferable**. The second is that recycled paint **must meet the same minimum performance standards** as comparable non-recycled paint, and that there must be comfort as to the ongoing continuance in spite of varying raw material streams." [27] MPI does not include a minimum recycled content level in their Green Performance™ Standard.

### ***The Collaborative for High Performance Schools (CHPS)***

The [Collaborative for High Performance Schools](#) (CHPS) specifications contain guidelines for Special Environmental Requirements (Section 01350) and address requirements for paints in Guideline IS9: Paints and Coatings, which are available [online](#). The guideline recommendation for coatings states "Specify the least toxic, low-formaldehyde, low-VOC or zero-volatile organic compound (VOC) paint that meets durability and other high performance requirements. Water-based paints and acrylic latex paints are lower in VOCs than solvent-based paints. While a variety of low-VOC and zero-VOC paints are now available to choose from, they vary in cost, potential toxicity, and performance. Therefore, paint selection should consider VOC content as well as overall composition and required performance characteristics, including cleanability, hideability, and durability." [28]

### ***United States Environmental Protection Agency (U.S. EPA)***

The U.S. EPA maintains a [Database of Environmental Information for Products and Services](#). This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services.

## **Tips for Writing Specifications**

### ***Sample Language***

When buying recycled latex paint, include specifications that require the paint to be at least 50 percent postconsumer recycled content. Besides environmental benefits, your specifications can ultimately help lead to a healthier market for recycled paint, making it more available for both private businesses and consumers. Here is a sample clause:

"Latex paint must contain a minimum of 50 percent postconsumer recycled-content where fitness and quality are equal, and cost is the same or lower than similar virgin content products. Preconsumer or secondary paint does not qualify as "recycled paint". Vendors must certify that latex paint meets this recycled-content specification. Vendors must also certify that the paint meets all material and performance requirements as specified in this solicitation. Vendors are encouraged to provide products that contain a higher percentage of postconsumer recycled content than the 50 percent minimum."

When buying less hazardous paint, include specifications that meet the [Green Seal Environmental Standard for Architectural Coatings \(GS-11\)](#), which establishes minimum criteria for hideability,

wearability, scrubability, maximum VOC limits and prohibited heavy metals and toxic organic substances. For information on Green Seal approved paint products, download the report titled "Green Seal's Choose Green Report: Architectural Paints," (December 1999) from the Minnesota Pollution Control Agency Web site.

Here is a sample clause for low-VOC and less hazardous paints:

"Latex paint must be low-VOC (less than 50 g/L minus water) and may not contain any of the following prohibited ingredients:

#### Heavy Metals

Antimony  
Cadmium  
Hexavalent Chromium  
Lead  
Mercury

#### Toxic Organic Substances

Acrolein  
Acrylonitrile  
Benzene  
1,2-dichlorobenzene  
Ethylbenzene  
Butyl benzyl phthalate  
Formaldehyde  
Isophorone  
Methylene Chloride  
Methyl ethyl ketone  
Methyl isobutyl ketone  
Naphthalene  
Phthalate esters  
1,1,1-trichloroethane  
Toluene  
Vinyl Chloride

For a list of paints that meet these low-VOC and less hazardous requirements, refer to the [list Green Seal of certified products](#). Vendors must certify that latex paint meets this low-VOC and less hazardous paint specification. Vendors must also certify that the paint meets all material and performance requirements as specified in this solicitation."

**Lowering VOC emissions.** The proposed SCAQMD limits on VOCs in paint will limit both flat and non-flat VOCs to no greater than 50 g/L for both interior and exterior surfaces. There are name brand interior paints available that have VOC emissions well below 50 g/L. [29] If the SCAQMD rules are too restrictive, one could consider adopting the Green Seal standard, but reduce the VOC levels in the paints (flat and non-flat for both interior and exterior) by 50 percent.

The maximum VOC levels would change to the following:

Paint Type	Interior	Exterior
Flat	25 g/L	50 g/L
Non-Flat	75 g/L	100 g/L

## VENDORS

### State Contracts

#### ***Statewide Paint, Recycled Latex and Semi-Gloss Contract***

Recycled latex paint is available through the Statewide Paint, Recycled Latex and Semi-Gloss contract (contract number 1-08-80-10) through the Department of General Services (DGS). The contract is effective from May 1, 2008 through May 1, 2009.

[Local agencies may use State procurement contracts.](#)

#### ***Statewide Paint, Maintenance (Latex) Contract***

Low-VOC and less hazardous paints have been available through the statewide latex paint contract with ICI Paints. To check the VOC level of a specific paint on this past contract, check its [MSDS](#). The contract was effective from January 18, 2005 through January 17, 2007. A new contract is currently under development.

[Local agencies may use State procurement contracts.](#)

### Other Sources

- **California Integrated Waste Management Board (CIWMB)**
  - The CIWMB's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.
  - See the [product directories](#) listed in the CIWMB's [Sustainable Building Tool Kit](#).
- **Earth 911's** Paint Wise program has a list of recycled paint manufacturers.
- The [Product Stewardship Institute's Paint Project](#) has a list of recycled paint manufacturers.
- **Green Seal** has a list of [GS-11 certified paints](#). The criteria address performance characteristics (abrasion resistance, opacity, stain removal), and prohibit or restrict the presence of certain heavy metals and toxic organic substances (VOC levels, aromatic compounds, chemical restrictions, toxics in packaging).
- **GreenSpec®** contains detailed listings for numerous environmentally preferable building products with descriptions, manufacturer information, and links to additional resources.
- The **Collaborative for High Performance Schools' (CHPS)** [list of low-emitting products](#) includes several paints. These products have been certified by the manufacturer and an independent laboratory to meet the CHPS Low-Emitting Materials criteria- Section 01350 -for use in a [typical classroom](#).
- The **Master Painters Institute** maintains a [list of products](#) that meet GPS-1-08. ([Download the text of the standard here.](#))
- The **Oikos® Green Building Source** [Product Directory](#) is searchable by product category and company name.
- The **South Coast Quality Air Management District** has a [list of companies manufacturing super-compliant coatings](#) (see page 18) that exceed current and future regulations on VOC emissions. Contact the manufacturers for information on specific product lines.

## SUCCESS STORIES

### State of California

During fiscal year 2002-03, California state agencies purchased approximately 33,000 gallons of recycled latex paint, approximately 11 percent by volume of all State government paint purchases. [\[30\]](#) Additionally, as noted in the [Performance](#) section, a dozen Fair and Exhibition sites in California have successfully used recycled latex paint. [\[31\]](#)

#### **California Department of Transportation (Caltrans)**

The Caltrans Torrance division uses recycled paint on many different types of surfaces, and reports that the recycled paint is "very user friendly," a "fine product" available in a range of colors, and that they are "very satisfied with the product, not only for the low cost but also for its ability to be applied to many different types of surfaces." [\[32\]](#)

#### **Elk Grove Unified School District (Elk Grove, CA)**

In 2003, the Elk Grove Unified School District used recycled paint on a trial basis at a single middle school. Two years later, the buildings "still look like they were just painted," according to facility and planning staff. The district further stated "we have been so impressed with the paint that we used it for our 2004 Paint Project. We now specify this product in our specifications for new construction and additions." [\[33\]](#)

#### **Portland Area, Oregon**

The Portland Metro Government (known as Metro) has been collecting surplus latex paint from households and businesses since 1992, and now processes more than 100,000 gallons of paint annually. The processed paint is sold as MetroPaint™ (a 100 percent postconsumer recycled latex paint) and it now holds a five percent share of the Portland paint market. The Metro Government building was painted with MetroPaint in the 1990s, and no paint-related problems have been reported. [\[34\]](#)

#### **State of Connecticut**

As described in the [Performance](#) section of this guide, the State of Connecticut applied recycled latex paint on municipal buildings at eight separate sites in 1997, and in 2001 during a follow-up study, the caretakers of the buildings reported that they were satisfied with using recycled paint to protect the buildings. [\[35\]](#)

#### **State of Minnesota**

According to the Minnesota Office of Environmental Assistance "several successful demonstration projects around Minnesota have showcased reprocessed recycled paint, proving that it is a recycled product that performs." Two of the demonstration projects are summarized below. [\[36\]](#)

In 1999, approximately 2,100 gallons of reprocessed latex paint were used to cover 90 percent of the painted surfaces of the University of Minnesota's new, six-floor McNamara Alumni Center. Reprocessed paint was applied on gypsum drywall in office spaces, conference rooms and hallways. When asked about performance, the painting sub-contractors and the university's facility manager said that the reprocessed paint was equal to virgin paint.

In 1997, Hennepin County used 1,200 gallons of reprocessed paint on its new public works facility in Medina, Minn. The reprocessed paint was applied by brush, roller and airless sprayer. According to the president of the painting company, "These products performed comparably with virgin paint products. This product showed that the coverage and viscosity of the recycled products are comparable to virgin latex paint."

## **RESOURCES**



**California Integrated Waste Management Board (CIWMB)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the CIWMB's [Recycled Latex Paint](#) page for information on the facts about recycled paint, why it should be used, the results of a performance study of recycled paint, and a list of companies that manufacture or distribute recycled paint. Environmentally preferable paint vendor information is also available in the sustainable building [product directories](#) that are included in the CIWMB's [Sustainable Building Tool Kit](#).

**Earth 911**

Phoenix, AZ

(877) EARTH911

Earth 911 provides community-specific information on recycling and hazardous waste management for consumers and small businesses. A new section of their Web site titled "Paint Wise" gives information on proper purchasing, storage, donation, and recycling of paint.

**Green Seal**

Washington, DC

(202) 872-6400

Green Seal is an independent, non-profit organization that strives to achieve a healthier and cleaner environment by identifying and promoting products and services that cause less toxic pollution and waste. Green Seal has established a list of low-VOC and low toxicity paints that meet their GS-11 standards for environmentally-friendly paints.

**King County Environmental Purchasing Program**

Seattle, WA

(206) 296-0100

(800) 325-6165

A pioneer and contemporary model in environmental procurement, King County provides sample contract specifications for environmentally preferable coatings, such as recycled paint. In addition, its Web site contains product experience studies including three for Recycled Paint Products. The site contains additional resources for environmental purchasing and waste reduction.

**Master Painters Institute (MPI)**

(888) 674-8937

The MPI is a nationally recognized organization that develops standards and specifications for the performance and the application of architectural coatings. In 2005, the MPI developed a Green Performance™ Standard (GPS-1-08) for environmentally preferable paints and coatings that also meet minimum performance standards. The MPI maintains a [listing of products](#) that meet GPS-1-08. ([Download the text of the standard here.](#)) The MPI also offers training to become a certified architectural coatings inspector.

**MetroPaint - Portland Metro Area**

Portland, OR

(503) 797-1650

Metro - a regional government in Oregon - has been collecting surplus latex paint from households and businesses since 1992, and now processes more than 100,000 gallons of paint annually. The processed paint is sold under the company brand MetroPaint, and is a rebled, 100 percent postconsumer,



recycled latex paint. Their Web site has technical information on the paint, including lab test results, product data information and a material safety data sheet.

**Minnesota Pollution Control Agency (MPCA)**

St. Paul, MN

(651) 296-3417

The MPCA provides assistance on the purchase of environmentally preferable products such as latex paint, re-refined oil, and recycled-content paper, as well as resources, assistance, grants, and loans in the areas of waste and pollution prevention, recycling, reuse, environmental education, and sustainable communities. The MPCA's [Sustainable Building Program](#) links to additional design guidelines and product directories that cite recycled paint as an environmentally preferable product.

**National Paint and Coatings Association (NPCA)**

Washington, DC

(202) 462-6272

The NPCA is a trade association representing approximately 350 paint and coatings manufacturers, raw materials suppliers and distributors. Their Web site contains a section on the proper management of leftover paint.

**The Office of the Federal Environmental Executive (OFEE)**

Washington, DC

(202) 564-1297

As part of its broader mission to promote sustainable environmental stewardship throughout the federal government, the OFEE promotes the acquisition of recycled-content, environmentally preferable, and bio-based products. The [OFEE's Web site](#) contains information on conducting facility inspections for compliance with the U.S. EPA's Comprehensive Procurement Guidelines, which designate consolidated and reprocessed latex paints as preferred construction products. Additionally, the Web site highlights success stories in environmental procurement, recycling, and waste prevention.

**Product Stewardship Institute (PSI)**

Boston, MA

(617) 236-4855

The PSI is a national non-profit, membership-based organization. The PSI works with state and local government agencies to partner with manufacturers, retailers, environmental groups, federal agencies, and other key stakeholders to reduce the health and environmental impacts of consumer products, including latex paint. The PSI takes a unique product stewardship approach to solving waste management problems by encouraging product design changes and mediating stakeholder dialogues.

The PSI has conducted extensive research on recycled paint since 2004. Recycled paint studies and background documents are available on their [PSI Paint Project](#) Web page.

**United States Environmental Protection Agency (U.S. EPA)**

Washington, DC

(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the U.S. EPA offers a range of information about products such as recycled latex paint. Visit the U.S. EPA's [Comprehensive Procurement Guidelines \(CPG\) Web site](#) for Recovered Materials Advisory Notices (RMANs), which recommend recycled-content levels. The site includes information on numerous [designated construction products](#), a [construction products fact sheet](#), a [CPG Supplier Database](#), and a [Database of Environmental Information for Products and Services](#).

- [1] Form 303 Household Hazardous Waste Collection data, Fiscal Year 2003-2004. Internal spreadsheet information collected by the California Department of Toxic Substances Control as reported to the California Integrated Waste Management Board, July 2005.
- [2] Product Stewardship Institute, Interim Progress Report on Paint Product Steward Initiative Project #8, Preliminary Research on Certification Options, Current Paint Recycling Manufacturing, Recycled Paint Testing, Page 6. Available at: <http://www.productstewardship.us>
- [3] Based on estimate of 2.3 gallons per person, per year average paint purchasing, as estimated by the Product Stewardship Institute, "A Background Report for the National Dialogue on Paint Product Stewardship" March 2004. Available at <http://www.productstewardship.us/displayPage.php?pageid=74>.
- [4] Ibid.
- [5] Product Stewardship Institute, Interim Progress Report on Paint Product Steward Initiative Project #8, Preliminary Research on Certification Options, Current Paint Recycling Manufacturing, Recycled Paint Testing, Page 6. Available at: <http://www.productstewardship.us/>
- [6] United States Environmental Protection Agency. Indoor Air - Publications. Indoor Air Facts No. 4 (revised): Sick Building Syndrome (SBS). Available at <http://www.epa.gov/iaq/pubs/sbs.html>.
- [7] California Air Resources Board. Research Notes. Abstracts of 1993 Research Notes. Available at <http://www.arb.ca.gov/research/resnotes/abst93.htm>. Accessed on January 9, 2006.
- [8] South Coast Air Quality Management District (SCAQMD). Rule 1113 Architectural Coatings. Amended July 9, 2004. See <http://www.aqmd.gov/rules/support.html>.
- [9] South Coast Air Quality Management District (SCAQMD). Rule 1113 Architectural Coatings. As of January 2006 there are proposed changes to Rule 113. See <http://www.aqmd.gov/rules/proposed.html#1113>
- [10] Sampling, Testing, and Evaluation of Recyclable and Recycled Latex Paint: Final Report December 1995. Prepared for California Integrated Waste Management Board by California Polytechnic State University (Cal Poly) San Luis Obispo. Available at <http://www.calrecycle.ca.gov/Publications/default.asp?pubid=310>.
- [11] MetroPaint. Metro Paint Lab Test Results. Available at <http://www.metro-region.org/article.cfm?ArticleID=12405>.
- [12] U.S. Green Building Council. LEED Rating System Version 2.0. June 2001. See <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220&>.
- [13] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Construction Products Fact Sheet. Available at <http://www.epa.gov/cpg/factshts.htm>.
- [14] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.
- [15] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Construction Products Fact Sheet. Available at: <http://www.epa.gov/cpg/factshts.htm>.
- [16] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Construction Products Fact Sheet. Available at: <http://www.epa.gov/cpg/factshts.htm>.
- [17] "Recycled-Content Latex Paint Shines at California's Fairgrounds" California Department of Food and Agriculture, Division of Fairs and Expositions, Sacramento California, Grant Final Report to CIWMB, July 2003. (Paper copy only for full report. See [www.ciwmb.ca.gov/buyrecycled/StateAgency/asktell/stories.htm](http://www.ciwmb.ca.gov/buyrecycled/StateAgency/asktell/stories.htm) for a summary of report.)
- [18] Connecticut Department of Environmental Protection. Evaluation of the Performance of Recycled Content Latex Paint in Connecticut. Available at [http://www.ct.gov/dep/lib/dep/reduce\\_reuse\\_recycle/rpaint.pdf](http://www.ct.gov/dep/lib/dep/reduce_reuse_recycle/rpaint.pdf).
- [19] MetroPaint Web site (See <http://www.metro-region.org/article.cfm?ArticleID=521>) and "Metro Paint™ Lab Test Results" (Available at <http://www.metro-region.org/index.cfm/go/by.web/id=12405>).
- [20] Statewide Paint, Maintenance (Latex) Supplement No. 1 to Contract 1-05-80-05 Revision A. Available at <http://www.pd.dgs.ca.gov/contracts/80-10.htm>.
- [21] Statewide Paint, Recycled Latex and Semi-Gloss Contract number 1-04-80-10. Available at <http://pdprox.pd.dgs.ca.gov/pin/html/1-04-80-10.htm> (offline).
- [22] State Of California DGS Invitation For Bid, Paint, Recycled Latex And Semi-Gloss; Solicitation Number 52447, August 27, 2003. (Paper copy only.)

- [23] Commercial Item Description A-A-3185 text can be found at <http://dsp.dla.mil/>. Once to the site, select "online specs," then "click here to get DSP files" then "assist quick search." For ID use A-A-3185.
- [24] United States Environmental Protection Agency. Comprehensive Procurement Guidelines Reprocessed and Consolidated Latex Paints for Specified Uses Web page. Available at <http://www.epa.gov/epawaste/conserve/tools/cpg/products/paint.htm#recommended>.
- [25] Aberdeen Proving Ground Paint Standards Study, 1999. See <http://www.epa.gov/epp/pubs/case/paint.pdf>.
- [26] U.S. Green Building Council. LEED Rating System Version 2.0. June 2001 See <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220&>.
- [27] Master Painters Institute. MPI Green Performance™ Standard [GPS-1-05] For Paints and Coatings. Available at <http://paintinfo.com/GPS/MPI%20GPS%201-05%20Version%20july%2027,%2005.pdf>.
- [28] Collaborative for High Performance Schools (CHPS) - Special Environmental Requirements (Section 01350) Guideline IS9: Paints and Coatings. See <http://www.chps.net/manual/index.htm>.
- [29] Website. Verified 1-20-06. Available at "<http://www.buildinggreen.com/>, under "finishes" and then "interior paints."
- [30] California Integrated Waste Management Board. "How Are We Doing?" State Agency Buy Recycled Campaign (April 19, 2004). Available at: <http://www.calrecycle.ca.gov/BuyRecycled/StateAgency/Status.htm>.
- [31] "Recycled-Content Latex Paint Shines at California's Fairgrounds" California Department of Food and Agriculture, Division of Fairs and Expositions, Sacramento California, Grant Final Report to CIWMB, July 2003.
- [32] Letter of Recognition from CalTrans Torrance Road Crew to Visions Recycling Inc. (re-processed paint manufacturer), dated June 4, 2005. (Paper copy only.)
- [33] Letter of Recommendation from Elk Grove Unified School District Facilities and Planning to Visions Recycling Inc. (re-processed paint manufacturer), dated March 3, 2005. (Paper copy only.)
- [34] Metro Paint Fact Sheet "Metro Facts" and personal communication September 26, 2005 with Jim Quinn, Hazardous Waste Program Manager, Metro, Portland, Oregon.
- [35] Connecticut Department of Environmental Protection. Evaluation of the Performance of Recycled Content Latex Paint in Connecticut. Available at [http://www.ct.gov/dep/lib/dep/reduce\\_reuse\\_recycle/rpaint.pdf](http://www.ct.gov/dep/lib/dep/reduce_reuse_recycle/rpaint.pdf).
- [36] Minnesota Pollution Control Agency. Recycled Latex Paint Success Stories. Available at <http://www.pca.state.mn.us/>

## BM - Plastic Waste Bags



### Material Availability:

As a result of [California's Plastic Trash Bag law](#), recycled content plastic trash bags are readily available. The California Integrated Waste Management Board annually publishes [lists of compliant trash bag manufacturers](#) and non-compliant manufacturers and wholesalers.

Compostable bags used for the collection of yard trimmings and food waste are also available. These bags can be used in large venue events and restaurant food scrap collection programs, where compostable bags and food service products can be collected in conjunction with food waste.



### Less Hazardous:

Although some pigmented and printed trash bags may contain heavy metals such as lead and cadmium, manufacturers are trying to avoid the use of heavy metals and toxic chemical additives. The use of water

or vegetable-based inks should be considered as an option to reduce the emission of volatile organic compounds (VOC) during the printing process.



#### **End-of-Life Management:**

Trash bags are designed to be disposed in landfills. However, some compostable bags are used to collect yard trimmings and food wastes for diversion to commercial compost facilities where microorganisms convert them to biomass, water, and carbon dioxide.



#### **Waste/Materials Management:**

Plastics represent 9.5 percent by weight, or 3.8 million tons, of the total solid waste disposed in California. Plastic trash bags alone represent 1.0 percent, or 390,460 tons, of the total solid waste disposed in California. [1]

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

Trash bags are non-packaging plastic products designed to store, handle, transport, and dispose waste in a safe manner. They are sold in different designs, colors, strengths, sizes, grades, thicknesses, and resins. The designs include bags with sealed bottoms to prevent leakage and perforations for tear-off and dispensing convenience. Hospitals and the California Department of Transportation (Caltrans) use pigmented bags with specially imprinted symbols. Hospitals, for instance, use red bags to dispose infectious wastes. Prisons use transparent bags to easily identify bag contents for recycling and ensure that dangerous items are kept out of prisoners' hands. Bags come in a variety of colors including, metallic silver, grey granite, blue, yellow, brown, orange and natural. They can be clear or opaque. Some bags contain a deodorizer that quickly destroys or masks tough odors.

Bags are sold in different grades that include light, medium, standard, regular, industrial/commercial, heavy, extra-heavy, and super heavy. Low density (LDPE), high density (HDPE), linear low density (LLDPE), and high molecular weight high density polyethylene (HMW-HDPE) are the most typical resins used in the manufacture of trash bags. These resins are not toxic. However, some of the chemical additives in the film could be toxic. Some trash bags contain antistatic, antibacterial, antioxidant, and pigmented products that could be toxic to humans and the environment. Of special concern is the presence of heavy metals such as lead and cadmium in pigments and dyes used in printing.

## **LAWS AND GUIDELINES**

## California

### Statute

#### State Agency Buy Recycled Campaign (SABRC)

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on plastic products be spent on plastic products with at least 10 percent postconsumer recycled content [exception: see content requirements for printer and duplication cartridges in [PCC 12209\(f\)\(2\)](#)].
  - The SABRC plastic products (PL) category includes, but is not limited to, trash bags, printer or duplication cartridges, diskettes, carpet, office products, plastic lumber, buckets, wastebaskets, containers, benches, tables, fencing, clothing, mats, packaging, signs, posts, binders, sheet, buckets, building products, garden hose, and trays (see [PCC section 12207](#)).
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC section 12211](#) requires PL purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

### Manufacturers

[Public Resources Code \(PRC\) section 42291](#) states that every manufacturer of regulated bags must meet one of the following requirements:

- a. "Ensure that its plastic trash bags intended for sale in this state contain a quantity of recycled plastic postconsumer material equal to at least 10 percent of the weight of the regulated bags," or
- b. "Ensure that at least 30 percent of the weight of the material used in all of its plastic products intended for sale in this state is recycled plastic postconsumer material."

### Wholesalers

Wholesalers are required to certify the names of the trash bag manufacturers from whom they purchase plastic trash bags (see [PRC section 42294](#)). The California Integrated Waste Management Board (CIWMB) posts a list of compliant manufacturers and non-compliant manufacturers and wholesalers. The compliant list is a resource listing of companies that make some bags that have at least 10 percent postconsumer plastic. Manufacturers and wholesalers must also be certified annually by the CIWMB before state of California agencies and departments can purchase from them. State agencies are prohibited from contracting with non-compliant companies for trash bags or any other products. For more information, see the CIWMB's [Recycled-Content Trash Bag Program](#) Web page.

### Labeling

[Chapter 619, Statutes of 2004 \(Karnette, SB 1749\)](#) prohibits a person from selling a plastic bag that is labeled "compostable," "biodegradable," "degradable," or anything similar unless the bag meets an existing American Society for Testing and Materials (ASTM) specification for the term used on the label.



This law is intended to prevent deceiving or misleading claims about the environmental impact of plastic bags by making such claims conform to uniform and universally recognized standards.

## **Federal**

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the [Comprehensive Procurement Guidelines](#) (CPG). Plastic trash bags are USEPA-designated items. "Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable." [\[2\]](#) This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [\[3\],\[4\]](#) The USEPA's recommended recovered materials content levels for plastic trash bags are available on-line.

"Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products." [\[5\]](#)

## **PERFORMANCE**

The performance of trash bags depends mostly on the type of resin used in their manufacture. Bags using LDPE have good clarity but lack strength. LLDPE bags, instead, have excellent strength with high puncture and tear resistance. HMW-HDPE is the higher-performing resin. It makes trash bags three times stronger and more durable than LDPE and LLDPE. Two or more resins can also be blended to enhance the performance of the bags. There are also special catalysts such as the metallocenes that make the film thinner and stronger. Metallocene LLDPE is gaining popularity because of its high clarity and increased strength. [\[6\]](#)

Any bag can fail if stressed beyond its intended use. Performance features such as puncture and tear resistance should be reviewed before choosing any bag, regardless of whether it has recycled content. Recycled-content bags that meet D882 ASTM standards will perform properly under normal service requirements. ASTM D882 covers the determination of tensile properties of plastics in the form of thin sheeting, including film (less than 1.0 millimeter in thickness). When purchasing bags, work with the vendor to determine the size, thickness, durability and other performance requirements that are appropriate for your application. [\[7\]](#) Following are some of the most common performance requirements for trash bags:

- Dart Drop Test - used to determine the resistance of a bag to local failure or puncturing of the film
- Elmendorf Tear Test - used to measure the resistance to tearing or puncture
- Wet Load Capacity - measurement of how much wet weight a can liner will hold
- Dry Load Capacity - measurement of how much dry weight a can liner will hold

## **AVAILABILITY**

The availability of bags featuring recycled content is somewhat dependent on the type of bag. For bags ranging in capacity from seven to 56 gallons and in thickness from 0.35 to 1.35 millimeters (mm), recycled-content bags are widely available; some with up to 100 percent postconsumer recycled content plastic. However, recycled content may be difficult to find in certain colors, sizes, and thicknesses. Moreover, specialty bags - such as food service, laboratory, and hospital waste bags - may have requirements that limit recycled content. [\[8\]](#)

All plastic trash bag manufacturers that sell regulated bags into the California marketplace are required to annually certify to the CIWMB that they meet one of the two postconsumer content requirements set forth in statute (see [Manufacturers](#) under "Laws and Guidelines.") The lists of compliant and non-compliant trash bag manufacturers are annually posted on the [CIWMB's Board's Web site](#). State agencies are prohibited from contracting with non-compliant companies for trash bags or any other product or service.

See [Vendors](#) for sources of trash bags.

## **COST**

The cost of recycled-content plastic trash bags depends on the vendor, type of bag, and special attributes or design of the bags, but pricing is comparable to non-recycled content bags. Printing and other designs add to the cost of trash bags, whether or not the bags contain recycled material. It is important to explore several vendors to get the best price. Billions of trash bags are imported from Asia where resin prices and labor costs are lower than in the U.S.

As for packaging, bags sold on a roll in a plastic bag are usually cheaper than those sold in a box, but some are not as easy to remove from the roll. What is gained in cost may be lost in convenience.

The evaluation criteria for trash bag bids should include the cost of testing samples of the product. For example, the Department of General Services (DGS) procurement program contracts with a testing laboratory and DGS bears the cost of initial laboratory testing of bags they may purchase. In other cases, the state entity (e.g., Caltrans) bears the cost of the initial laboratory testing after awarding the contract. Should the product fail laboratory testing and should a laboratory retest be necessary to determine the acceptability of replacement bags, the supplier bears all costs associated with the laboratory retest.

### **Tips on Buying Trash Bags**

- Before purchasing recycled trash bags in large quantities, ask for testing results to ensure that you are getting a product with acceptable performance. Keep copies of test results. This will help resolve disputes and provide information to public and private agencies interested in using the product tested.
- Give preference to bids offering recycled content or award additional points based on the level of recycled content offered in the bid. Be sure to specify that bags have at least 10 percent postconsumer recycled content.
- Performance features such as puncture and tear resistance should be reviewed before choosing any bag, regardless of whether it has recycled content.
- Purchase bags that match performance with intended use. Ask for testing results to confirm performance. Also, keep in mind that thinner bags will reduce the amount of plastic going to the landfill.
- The type of closure device also matters. Flaps and handles are strongest. Drawstrings are less sturdy, but their contrasting color makes finding the bag's opening easier. [\[9\]](#)

## **SPECIFICATIONS**

### **California**

Performance or product specifications (see [ASTM specifications](#) below) for trash bags are preferred over material specifications because product specifications are based on performance characteristics. Method and material specifications sometimes limit the use of recycled-content products by disqualifying recycled feedstock or recycling-based technologies and processes.



## California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services (DGS) develops and reviews specifications for statewide commodity standards and information technology. The DGS established the minimum requirements for plastic waste receptacle liners and bags. The supplier shall provide to the Procurement Division a written letter certifying the bags offered comply with the DGS' specification including packaging requirements, dart impact, and load performance test. The DGS classifies bags into five categories:

- Category I bags may be made of any type of plastic
- Category II bags must be made of polyethylene or ethylene copolymer
- Category III bags shall be the same as Category I except that they may be colored and intended to maximize postconsumer recycled content
- Category IV bags shall be the same as Category II except that they may be colored and intended to maximize postconsumer recycled content
- Category V bags covers specialized bags used by Caltrans.

These categories were developed to differentiate between large and small orders. Smaller orders (less than 1,000 bags), for instance, are placed in Category I. Because bags in Categories III and IV correspond to larger orders, suppliers charge less per bag.

## **[ASTM Specifications](#)**

Reference the following documents, or their latest revisions, for performance requirements and for testing purposes:

ASTM D 882-95A	Tensile Strength
ASTM D 1922-94A	Elmendorf Tear Resistance
ASTM D 1709-91	Dart Drop Test
ASTM D 5033-90	Standards Relating to the Proper Use of Recycled Plastic

## **United States Environmental Protection Agency (USEPA) Specifications**

USEPA Comprehensive Procurement Guidelines (CPG) 2002 recommend trash bags with a postconsumer recycled content between 10 percent and 100 percent. The United States General Services Administration's (GSA) Commercial Item Description (CID) for general purpose plastic bags, A-A-2299B, covers plastic trash bags for office and food service use. CID A-A-1668D covers rip resistant bags for outdoor and medical waste applications. According to the information available to USEPA, neither CID A-A-2299B nor A-A-1668D precludes the use of recovered materials content in the manufacture of plastic trash bags. [\[10\]](#)

## **Other States**

Minnesota uses a set of comprehensive specifications for trash bags. These specifications include scope, classification, reference ASTM standards, performance, technical data, and product testing. All this information is part of Appendix G.3 of the *Environmentally Preferable Purchasing Guide* published by the Solid Waste Management Coordinating Board (SWMCB) of Minnesota.

Several states, including Michigan, Nebraska, Minnesota, Massachusetts, and Delaware, have their own specifications for plastic trash bags containing recovered materials. Most of the states require a minimum of 10 percent postconsumer recycled content. The Commonwealth of Massachusetts requires all bags made from 100 percent LLDPE to contain a minimum of 20 percent postconsumer recycled content. The performance requirements under Wisconsin's specifications define features quantitatively in terms of properties, test methods, and thickness by bag category.

### Tips for Writing Specifications

- Survey the marketplace to become familiar with available products and features
- Define [performance](#) and features quantitatively in terms of tolerances, ranges, thresholds, and limits (see the specifications used by Minnesota discussed above)
- Use enforcement words "shall, must, minimum, maximum, less than, no more than, and shall not exceed" to describe required limits
- Do not over specify
- Include environmental safety language requiring bags and printing free of heavy metals and toxic additives
- Include in your specifications for trash bags that suppliers (if you order or purchase directly) or your janitorial service (if they order or purchase) meet or exceed the California Plastic Trash Bag Law's minimum recycled content requirements while meeting your performance, cost, and availability standards

## VENDORS

Vendors can be found through the following online resources:

### California

#### **State Contracts**

Recycled-content trash bags (aka "liners") are available from companies with state contracts. For more information, visit the California Strategic Sourcing Initiative Maintenance, Repair and Operating (MRO) Supplies Web page. Note: To find detailed product descriptions on contractors' Web sites, it may be necessary to view their on-line "Big Book" or larger catalog. Look for terms such as "post consumer," "post consumer resin," and "recycled." For example, go to the [Maintenance, Repair and Operating \(MRO\) Supplies Web page](#) and see the Web sites for MSC Industrial Supply Company (bag: Reclaim 100; see its Big Book page) and Grainger Industrial Supply (bag brand: Tough Guy. Some Tough Guy bags have the following terms somewhere in their descriptions: "material post consumer resin" and "post consumer waste trash can liners").

#### **California Integrated Waste Management Board (CIWMB)**

- The CIWMB [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers. To verify that trash bag suppliers on this database are not listed as non-compliant with the Plastic Trash Bag Law, see the [CIWMB's Web site](#). You should not buy from non-compliant companies.
- The CIWMB also provides a [list of certified trash bag manufacturers](#) who offer bags with recycled content.

### Other

#### **Federal Government**

- **United States Environmental Protection Agency (USEPA) - Comprehensive Procurement Guidelines (CPG) Supplier Database**

The USEPA's [CPG Supplier Database](#) is a searchable database of vendors who sell or distribute CPG-designated products with recycled content. This database identifies manufacturers and suppliers of trash bags containing recovered materials.

- **General Services Administration (GSA)**  
[GSA Advantage](#) lists products, including recycled-content and CPG-compliant trash bags, available through the Federal Supply Service.

### **Minnesota State Contracts**

One of Minnesota's vendors offers recycled-content trash bags. For more information, see the "Vendors" heading in the Plastic Waste Bags section of the *Environmentally Preferable Purchasing Guide* published by the Solid Waste Management Coordinating Board (SWMCB) of Minnesota.

### **Office Supply Outlets**

Many sizes and styles of recycled-content plastic waste bags are available from most office supply catalogs and outlets. Typically, office supply catalogs mark recycled-content products with a green recycling symbol. When shopping in office supply stores, check the packaging or shelf tags for information on whether the product has recycled content, and what percentage is postconsumer recycled content.

## **SUCCESS STORIES**

### **City of San José, CA**

The city of San José recognized that with ever-increasing amounts of materials being collected, the city needed to protect its investment in its own recycling program. To make sure the collected recyclables eventually end up in products bought by other agencies and businesses, the city set a good example by increasing the amount of recycled-content products (RCP) purchased. San José currently buys over 40 types of RCPs that include janitorial products such as plastic trash can liners, and plastic refuse bags.

[\[11\]](#)

### **State of California**

As reported in the trash bag certification program, the State used approximately 3,750 tons of postconsumer material in 2005. According to the Department of General Services, the state of California spends between \$2million and \$3 million per year in purchasing trash bags.

An advisory committee developed a waste reduction program that has been implemented in the California Environmental Protection Agency (Cal/EPA) Headquarters Building in Sacramento. As part of its waste reduction program, Cal/EPA's staff uses mini desktop garbage cans, without liners, with central collection bins instead of trash cans in each office. In this way, far fewer trash bags are needed. Trash bag use is also reduced through the implementation of reusable cloth liners, instead of trash bags, in the receptacles used to collect dry recyclable materials. The elimination of garbage can liners in each office space eliminated \$65,000 in annual purchases. Likewise, the use of reusable cloth bags in the centrally located recycling bins saves \$27,000 per year. See [Greening Your Building Toward Your Bottom Line](#) for additional information on these and other waste reduction activities.

### **Cities of Berkeley and San Francisco, CA**

Berkeley and San Francisco use biodegradable plastic bags for the collection and composting of their commercial food scraps, food-soiled paper, wax-cardboard, and green waste. While San Francisco's composting program accepts only bags certified by the [Biodegradable Products Institute](#) (BPI), Berkeley accepts non-BPI certified polyethylene-based biodegradable bags. [\[12\]](#) Although not as strong as the petroleum-based bags, the compostable bags in both programs are performing satisfactorily. While prices go down, performance and availability of compostable bags are expected to increase.

## **RESOURCES AND WEBSITES**

**American Society for Testing Materials (ASTM)**

West Conshohocken, PA

(610) 832-9585

ASTM International is a non-profit organization for the development and publication of voluntary consensus standards for materials, products, systems, and services. Based on ASTM performance standards, bags are categorized as light, medium, heavy, extra-heavy, and extra-heavy-duty.

**Biodegradable Products Institute (BPI)**

New York, NY

(888) 274-5646

The International Biodegradable Products Institute is a multi-stakeholder association of key individuals and groups from government, industry, and academia promoting the use and recovery of biodegradable plastic materials. BPI introduced a logo that certifies a product as being compostable in municipal and commercial composting sites.

**California Integrated Waste Management Board (CIWMB)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

- **Plastic Trash Bag Program**  
The CIWMB monitors the provisions of the Public Resources Code with respect to plastic trash bag mandates. Manufacturers and wholesalers selling trash bags in California must meet the mandates and be certified annually by the CIWMB before state of California agencies and departments can purchase from them.
- **Recycled-Content Product (RCP) Directory**  
This directory has been set up to assist individuals, small business owners, state agencies, and corporate buyers in the commitment to buy recycled. The RCP Directory lists thousands of products containing recycled materials as well as information about the manufacturers, distributors, and re-processors of these products.
- **State Agency Buy Recycled Campaign**  
The State Agency Buy Recycled Campaign (SABRC) is a joint effort between the California Integrated Waste Management Board (CIWMB) and the Department of General Services (DGS) to implement State law requiring State agencies and the Legislature to purchase products with recycled content.

**Minnesota Pollution Control Agency (MPCA)**

St. Paul, MN

(651) 296-6300 or (800) 657-3864

MPCA is a state agency that provides information, assistance, grants, and loans in the areas of waste, pollution prevention, recycling, reuse, and environmental education. MPCA's Web site houses many resources on plastic waste bags, including a vendor list and a success story.

**Recycled Plastic Products Directory**

Arlington, VA

(800) 2-HELP-90

The American Plastics Council, a trade association for plastics manufacturers, maintains a Web site containing information on recycled-content plastic products such as trash bags, as well as information on recycling plastics.

**United States Environmental Protection Agency (USEPA)**

Washington, D.C.

(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, USEPA offers a range of public information about products such as trash bags. Visit USEPA's [Comprehensive Procurement Guidelines \(CPG\)](#) Web site for its Recycled Material Advisory Notices (RMAN), which recommend recycled-content levels. Since 2004, [USEPA has offered fact sheets](#) that summarize CPG information, USEPA's recovered materials content recommendations, case studies from around the country, and key resources, associations, and Web sites. For information on trash bags, see the [2004 Comprehensive Procurement Guidelines Buy-Recycled Series Nonpaper Office Products Fact Sheet](#).

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- [1] State of California. California Integrated Waste Management Board. *2003 California Waste Characterization Study*. Available at <http://www.ciwmb.ca.gov/plastic/>.
- [2] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Nonpaper Office Products Fact Sheet. Available at <http://www.epa.gov/cpg/factshts.htm>. Accessed on August 23, 2006.
- [3] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.
- [4] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Nonpaper Office Products Fact Sheet. Available at <http://www.epa.gov/cpg/factshts.htm>. Accessed on August 23, 2006.
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- [11] City of San José. Recycled Products: The Way in San José. California Integrated Waste Management Board publication available at <http://www.ciwmb.ca.gov/publications/BuyRecycled/42296071.doc>.
- [12] Kass, Larry. Expanding Participation in Food Recycling Programs. *BioCycle*, September 2004. p. 43.

## BM - Structural Integrated Pest Management

### Environmental and Health Issues and Recommendations



#### Less Hazardous:

Choose vendors (pest control operators or PCOs) who are trained in integrated pest management (IPM) and are skilled at preventing pest problems without resorting to routine spraying. Improper use or disposal of some pesticides may result in contamination of water bodies, groundwater, or sewage effluent.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background](#)
- [Environmental and Health Issues](#)
- [Components](#)

- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## BACKGROUND

Instead of hiring vendors (pest control operators or PCOs) to routinely spray pesticides in or around buildings, an increasing number of building managers contract out for integrated pest management (IPM) services. IPM is an approach that focuses on long-term prevention of pests and is widely used by public agencies and school districts throughout California. (The steps used to establish and carry out an IPM program are explained under [Components](#).)

**Conventional pest control.** Until recently, routine spraying was thought to be insurance against insect or rodent infestations, and building managers automatically hired a monthly pest control service to spray indoors and around the building's perimeter [\[1\]](#) at regular intervals, whether or not pests were present. Pest management experts now recognize that this approach provides at best a temporary solution, and creates potential health and environmental risks both indoors and outdoors for building occupants who are asthmatic or chemically sensitive.

Insect and rodent pests enter and infest structures when they find food, water, access, and shelter. IPM emphasizes eliminating sources of food and water, and limiting the ways pests enter or find refuge in a building - for example, by caulking holes and cracks, removing clutter, and installing doorsweeps.

For pest control operators (PCOs) hired to practice IPM, pest prevention involves regularly inspecting buildings and grounds for conditions that attract pests. It's essential that PCOs correctly identify specific pests before trying to manage them, or efforts may be directed toward the wrong critter. [\[2\]](#) Along with inspection goes monitoring - a way to keep track of pests that ranges from casual observation to careful data collection using quantitative methods. PCOs then take this information and recommend how to make the building inhospitable to pests. It's essential that PCOs and building managers communicate, and that building managers educate building occupants about their role in keeping the building unattractive to pests.

**IPM Practices in California's Schools.** Since 1993, the California Department of Pesticide Regulation (DPR) has worked with school districts in the State to provide information about IPM. During this time, a few innovative districts have developed their own IPM programs. In 2001, the enactment of the Healthy Schools Act of 2000, put into place right-to-know requirements such as notification, posting, and record keeping for pesticides used at California's K-12 public schools. The law also encourages use of IPM practices that are safer for school environments, ultimately reducing children's exposure to pesticides.

## ENVIRONMENTAL AND HEALTH ISSUES

### Pesticide Toxicity

Two different pesticide products may contain the same active ingredient, the part of the pesticide that kills the pest, but yet differ in toxicity. Acute toxicity results from a single dose or short-term exposure of a



substance, and chronic toxicity by repeated small doses over a long time. The United States Environmental Protection Agency (U.S. EPA) assigns signal words (danger, warning, caution) by level of acute toxicity.

### **Pesticide Exposure**

People can be exposed to chemicals by inhalation or through their skin, mouth, nose, or eyes. Exposure is intensified when a chemical volatilizes (evaporates). Most reported pesticide mishaps in buildings result from applications of aerosols or liquids. The volatilizing pesticide doesn't have to be toxic to cause an allergic reaction or asthma—even some botanical products can cause problems if used in a closed area. When used in cracks and crevices, baits in the form of gels or pastes are the safest bet when chemical treatment is necessary.

### **Do-It-Yourself Pest Management**

The building manager should instruct building occupants to leave their own pesticides at home. Building policy should prohibit the use of repellents such as insecticidal ant chalk (also known as Chinese chalk), which is illegal. Ant chalk looks just like regular chalk and contains pyrethroids - pesticides that may cause illness.

### **Contamination of Water**

Pyrethroids are insecticides popular as commercial and residential perimeter sprays. After an application, irrigation or rain may convey pyrethroids from concrete, asphalt, or landscaping into storm drains, which in most of California drain untreated directly to surface water, such as creeks and streams. Studies have shown that urban sources of pyrethroids enter surface water, where minute quantities kill aquatic organisms.

## **COMPONENTS**

An IPM program combines several practices to prevent pest infestations. Designate a knowledgeable, trained staff member to work with the pest control operator and building-maintenance personnel to be sure IPM recommendations are followed. Here are the steps taken by pest control operators who use IPM practices:

- **Identify** the pest so you know how to proceed. Do you have an infestation of German cockroaches that demands immediate attention, or just harmless ground beetles that crawled into a warehouse for a few days?
- **Inspect the building** and its perimeter for pests. Look for conditions that encourage pests—food, water, access, and harborage. Look for evidence of the pest, damage it causes, or the pest itself.
- **Monitor regularly for pests** using traps. For example, sticky traps are often used to check for cockroach presence. From your catches, you can tell which species you have, and whether you have a full-blown infestation. Young roaches as well as adults indicate that roaches are reproducing nearby.
- **Keep records** of pest levels, date, locations, weather, and other conditions that may give rise to pests. Monitoring records should show the name of the pest and its stage, where the monitoring is taking place (a map is useful), when monitoring takes place, and who's doing the monitoring. Using a form will simplify recordkeeping; many monitoring forms are available on the Internet.
- **Decide what's an acceptable level** for each pest and at what point you need to take action. For example, finding one German cockroach in a kitchen would lead to the initial IPM steps of identification, inspection, and monitoring.
- **Use practices** that effectively manage the pest, and that pose the least hazard to human health and the environment. Preventive practices fall under the categories of good facility design [\[3\]](#) (also known as pest-proofing) and maintenance-exclusion, sanitation, and moisture management.



- **Evaluate** the effectiveness of your IPM program. Do you need to change anything you're doing?

**What about emergencies?** What if there's a sudden ant invasion? IPM works well preventively, but if you're faced with a surprise infestation, don't throw the IPM steps listed above out the window. Make sure you correctly identify the pest and inspect the building beyond the obvious infestation site. For most large infestations, cleaning and making simple repairs will stop access by the pest and remove food and water sources. You can use a soapy water solution to clean up ant trails, or a vacuum cleaner to suck up cockroaches.

## LAWS AND GUIDELINES

### California

#### *Statute*

**IPM for State Buildings.** Existing state law (AB 2472, Chapter 242, Statutes of 2003) provides that it is the policy of the State to protect public health and safety in a manner that complements sustainability as an extension of resource conservation. It also states that the safe handling, reduction, or elimination of pesticide use in state buildings and on state lands is an important step in providing all state employees and members of the public with a safe, healthy environment.

**Healthy Schools Act.** The Healthy Schools Act of 2000 is a right-to-know law that applies only to K-12 public schools.

**Structural Pest Control Board.** The Board was created in 1935 to regulate the practice of structural pest control, provide for the registration and licensing of Pest Control Operators, and protect the public in the practice of structural pest control. The Structural Pest Control Act is available on the Board's Web site.

### Federal

Visit the U.S. EPA's Web site for information on federal laws that regulate pesticides. Please note that "Individuals applying pesticides must do so in a manner not only consistent with federal laws, but also consistent with state laws and regulations which differ from state to state. In general, states have primary authority for compliance monitoring and enforcing against use of pesticides in violation of the labeling requirements." [\[4\]](#)

## PERFORMANCE

Hiring a vendor who uses IPM practices will ensure that pests in and around your building are managed safely and effectively. It's likely that the vendor will recommend cleaning up areas and making repairs; it is essential that these recommendations are carried out. Keep in mind that IPM is preventive, and vendors cannot manage pests without the participation of building managers and occupants, or pest problems will persist. Simple changes may include cleaning up break rooms and not overwatering plants. More complex and expensive changes may involve patching holes and crevices, sealing floor drains and vents, and installing door sweeps. Some vendors may agree to include training sessions for office and maintenance staff.

## AVAILABILITY

California does not yet provide special certification for vendors trained in IPM practices, but in 2006, draft standards will form the basis of a pilot certification program for structural IPM. Refer to Specifications for tips on selecting knowledgeable and experienced IPM professionals.

## **COST**

Most public agencies that have switched to an IPM approach have in the long run experienced reduced pest management costs. Sometimes costs rise during the transition period as new equipment is acquired or building upgrades are implemented. IPM can reduce costs by eliminating regular pesticide spraying, but those savings may be redirected toward preventive practices, such as training employees, inspecting for pests, and investing in building and landscaping improvements. Improved maintenance-better sanitation and making repairs-will help make the building more attractive to everyone except pests. When the [City of Santa Monica](#) switched to an IPM approach in 1996 for all city facilities, costs were 30 percent lower than the conventional approach used previously. In Cape May County (pdf, 435 kb), New Jersey, IPM adoption saved nearly \$45,000 between 1993 and 1998 for combined structural and landscape IPM programs.

## **SPECIFICATIONS**

### **California**

#### ***Sample Language***

Thorough specifications help eliminate low bidding by firms unwilling to use an IPM approach. The city of [Santa Monica](#) requested vendors to demonstrate their qualifications by submitting the following information:

- Résumés of service technicians or relevant subcontractors who will be on site to service the account or supply technical support.
- A description of experience in the design or implementation of IPM programs (including specifics about the types of equipment and products used to control pests).
- A list of clients receiving IPM service from the company.
- A description of training provided to clients.
- A summary of all regulatory inspections and violations in the past five years and the company's response to any violations.

#### ***Examples***

Various cities and counties in California. During 2006, cities and counties in the San Francisco Bay Area and part of the Sacramento Valley will compile sample contract language for structural and landscape IPM that includes requests for proposals or qualifications, and specifications. Until the city and county samples are posted on the Urban Pesticide Pollution Prevention (UP3) Web site, see the federal [General Services Administration specifications](#) linked below.

### **Other States**

#### ***Maryland***

Maryland Public Schools. Integrated Pest Management in Schools: Contracting Guidelines for IPM Services in Maryland Public Schools (pdf, 736 kb). This 110-page document, published in 2001, covers General Contract Components on pages 5-15.

#### ***Wisconsin***

Wisconsin Public Schools. Things to consider when hiring a professional pest control operator. 2000. Tips adapted from the General Services Administration (see below).

### **Federal**

- General Services Administration (GSA). Integrated Pest Management Program Contract Guide Specification. 2005 Revision.
- United States Environmental Protection Agency (U.S. EPA): IPM Contract Performance Specifications (pdf, 24 kb). This five-page summary is modified for schools and adapted from the GSA specifications.

### **VENDORS**

See [Availability](#).

### **SUCCESS STORIES**

#### **City of Santa Monica, California**

Santa Monica's IPM program (pdf, 513 kb) began as an effort to reduce the use of all toxic substances by the city to safeguard both the environment and the health of city workers. The city began by consulting IPM experts, developed criteria for hiring contractors, suggested appropriate training for city staff, and solicited input from facility managers of city buildings. The Request for Qualifications developed by this process is the benchmark in California for hiring vendors who do IPM. The initial process was set up as follows: Once vendors qualified, they completed a Request for Proposal that required descriptions of how the vendor would manage pests such as Norway rats, German cockroaches, and pharaoh ants. They also had to list management options for nine pests and rank the options in order of lowest to highest risk to human health and the environment. Next, the vendors met for a walk-through tour of a building as a way to demonstrate their IPM know-how. Knowledge of IPM practices and technical expertise had priority over cost.

#### **City and County of San Francisco, California**

San Francisco's Pesticide Program, established by an IPM ordinance in 2001, was enacted to reduce the use of pesticides on city property by city departments, agencies, and contractors.

The IPM ordinance prohibits use of toxic pesticides including carcinogens and reproductive toxins, and requires the posting of notices and contact information to inform the public whenever a pesticide is used on city property. The city's pest control contractor has eliminated the use of pesticides in more than 50 percent of visits to city buildings. City staff have received extensive training in alternative practices for managing pests and are using tools such as green flammables, containerized baiting systems, insect growth regulators, weed cloth, and mulches.

#### **Marin County, California**

Successful implementation of IPM programs by Marin County departments has resulted in significant reduction in pesticide use. The Marin County Civic Center cafeteria has eliminated liquid and aerosol pesticides. They now perform routine pest monitoring to prevent pest problems in the food service areas, and, when necessary, use reduced-risk baits and traps.

### **RESOURCES AND WEBSITES**

#### **California Department of Pesticide Regulation (DPR)**

Sacramento, California  
(916) 445-4300

The California School IPM Web site was created by DPR as part of its implementation of the [Healthy Schools Act of 2000](#). At the site, you will find a variety of documents, Web links, and other resources related to the Act and to integrated pest management in schools.

**California Structural Pest Control Board**

Sacramento, California

(916) 561-8700

The California Structural Pest Control Board licenses PCOs.

**Pest Control Operators of California**, the trade organization for PCOs, supports the use of IPM instead of traditional pest control, particularly in sensitive sites such as schools, hospitals, and restaurants.

**United States Environmental Protection Agency (U.S. EPA)**

Washington, DC

(202) 272-0167

The U.S. EPA maintains an Integrated Pest Management (IPM) in Schools web site.

Armed Forces Pest Management Board Technical Guide No. 29. 2003. Integrated Pest Management (IPM) in and Around Buildings. This 25-page guide covers structural and wood-destroying pests.

Brosseau, G. 2003. Less-Toxic Pest Management: Finding a Company That Can Prevent Pest Problems. Our Water Our World, 2-page fact sheet. (pdf, 102 kb)

Central Contra Costa Sanitary District. 2004. Pesticides and Water Quality. Our Water Our World, 2-page fact sheet. (pdf, 101 kb)

Davidson, N. and S. Simmons. 2005. Curriculum for Structural IPM. California Department of Pesticide Regulation. 47 pp. A curriculum for school facility directors and staff; describes how to prevent and manage structural pest infestations. (pdf, 3,168 kb)

Drlik, T. and B. Brandenburg. 2006. Draft standards for Certification in Structural Pest Management. Once completed, will form the basis of a pilot certification program for structural IPM.

Flint, M.L., S. Daar & R. Molinar. 2003. Establishing Integrated Pest Management Policies and Programs: A Guide for Public Agencies. ANR Pub. 8093. 13 pp. Adoption of a written IPM plan is an important first step in implementing integrated pest management practices. This publication takes you through the process, step by step. (pdf, 129 kb)

O'Connor-Marer, Pat. 2006. Residential, Industrial, and Institutional Pest Control, 2nd Ed. ANR Pub. 3334. 242 pp. A compendium on managing structural, food, and fabric pests, rodents, birds, and weeds.

Quarles, W., B. Brandenburg, and T. Drlik. 2002. Pest Control Operator (PCO) IPM Program Evaluation. A 50-page study that identifies challenges to widespread acceptance of IPM among PCOs. (pdf, 789 kb)

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[1] Pest control operators commonly include perimeter treatments as part of their monthly service. A pesticide, usually a pyrethroid, is sprayed around the building's foundation to kill ants, other insects, and spiders. Although the treatment may kill some exposed insects-including foraging ant workers-and spiders quickly, ant queens hidden underground escape the spray and continue to reproduce. Perimeter treatments are repeated regularly to give the impression that pests are under control.

[2] One well-known example involves field cockroaches, a species that normally lives and reproduces outdoors in many parts of California. Field cockroaches resemble German cockroaches, which are the most common indoor roach species. During dry fall weather, field roaches may come inside buildings. Installing weather stripping around doors will probably prevent their movement indoors, but putting out baits would be unnecessary.

[3] Buildings should be constructed to keep out pests, eliminate places where pests can live, and make easy cleaning possible.

[4] United States Environmental Protection Agency. Pesticide Compliance and Enforcement Web site. Available at <http://www.epa.gov/pesticides/enforcement/index.htm>.

## Water – Efficient Fixtures and Appliances

### Environmental and Health Issues and Recommendations



#### Conserves Water:

Low-flow toilets, urinals, sinks, and shower fixtures; high-efficiency clothes washers, and low water consumption kitchen appliances improve water use efficiency.

- Save water by using water-efficient fixtures and appliances.



#### **Conserves Energy:**

A large amount of energy is used to pump, treat, heat, and deliver water. [1],[2] In California, "water-related energy use consumes 19 percent of the state's electricity, 30 percent of its natural gas, and 88 million gallons of diesel fuel every year." [3] Improvement in water use efficiency can lower energy needs.

- Conserve energy by using water-efficient fixtures and appliances.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

### BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

In 2000, cities and suburbs in California used about 8.7 million acre-feet of water. [4] Several types of bathroom fixtures, clothes washers, and kitchen appliances can reduce water consumption and hot water heating needs. Bathroom fixtures can be coupled with electronic control devices to provide efficient "no-hands, no-touch" controls - improving water use efficiency while promoting proper sanitation.

### Environmental Issues

#### ***Water Use Efficiency***

Selecting water-efficient fixtures can reduce sewer and water bills. In addition, efficient water use reduces the need for expensive water supply and wastewater treatment facilities, helps maintain healthy aquatic and riparian environments, and reduces the energy needed to pump, treat, and heat water. [5] Water is used in the manufacture of products, during a product's use, and in cleaning. Consequently, water efficiency and pollution prevention can occur in several product life cycle stages.

### **High-Efficiency Toilets**

The plumbing industry has introduced toilet fixtures that have an average flush volume lower than the mandated 1.6 gallons per flush. The [California Urban Water Conservation Council](#) (CUWCC) has worked with selected water agencies to establish efficiency criteria for these fixtures. A High-Efficiency Toilet (HET) is defined as a fixture that flushes a maximum volume of 1.3 gallons per flush or less. There are three types of HETs: dual-flush, pressure-assist, and gravity-fed. Currently, there are no flushometer valve and bowls that meet the HET definition.

### **High-Efficiency Urinals**

High-Efficiency Urinals are defined by the CUWCC, in cooperation with water authorities and local agencies, as fixtures that have an average flush volume lower than the mandated 1.0 gallon per flush and zero water consumption urinals. [6]

### **High-Efficiency Clothes Washers**

According to the CUWCC, "High-efficiency clothes washers (HEWs) utilize technological advances to deliver excellent wash performance while saving both water and energy. Resource efficient models use 35 percent to 50 percent less water. This reduction in water use means less energy needed to heat the water (approximately 50 percent less energy)." [7]

### **Pre-rinse Spray Valves**

According to a CUWCC report, the "dishwashing operation in a typical restaurant consumes over two-thirds of all of the water used by that establishment. In some cases, nearly one-half of the water used in dishwashing is consumed by the pre-rinse spray valve, which is used to remove food from dishware, utensils, and pans before placing them in the dishwasher. These valves currently can be purchased with a variety of flow rates. Most that are currently purchased and installed are over 3.0-gpm [gallons per minute]. The high efficiency replacement valves used in the Rinse & Save Program have a rating of 1.6-gpm or less." [8]

## **LAWS AND GUIDELINES**

### **California**

#### **Statute**

#### **Bathroom Fixtures**

#### **[Health and Safety Code \(HSC\) section 17921.3](#)**

Effective in 1992, a new water-efficiency standard for restrooms became the law in California. The maximum flush volume for each of these fixtures was:

- Water closets and associated flushometer valves that use no more than 1.6 gallons per flush;
- Urinals and associated flushometer valves that use no more than 1.0 gallon per flush;
- Showerheads that use no more than 2.5 gallons per minute (gpm); and
- Lavatory and sink faucets that use no more than 2.2 gpm.

[HSC section 17921.3\(c\)](#) states that "On and after January 1, 1994, all water closets sold or installed in this state shall be water closets and associated flushometer valves, if any, which use no more than an

average of 1.6 gallons per flush and which meet performance standards established by American Society of Mechanical Engineers standards A112.19.2-1990 and A112.19.6-1990, and urinals and associated flushometer valves, if any, which use no more than an average of one gallon per flush and which meet performance standards established by American Society of Mechanical Engineers standards A112.19.2-1990 and A112.19.6-1990. Blowout water closets and associated flushometer valves are exempt from the flush volume requirements of this section."

### ***California Code of Regulations***

#### **Washing Machines**

**[California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4, Section 1605.3\(p\)\(1\)](#)**

Effective January 1, 2007, the maximum water factor for commercial clothes washers shall be 9.5. (The water factor "is a measure of the total water used by the clothes washer. The less water used per cubic foot of laundry, the lower the water factor, and the greater the machine efficiency." [\[9\]](#))

#### **Commercial Pre-rinse Spray Valves**

**[California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4, Section 1605.3\(h\)\(3\)\(A\)](#)**

The flow rate of commercial pre-rinse spray valves manufactured on or after January 1, 2006, shall be equal to or less than 1.6 gpm at 60 pounds per square inch (psi).

### ***Policy***

#### **Executive Order S-20-04**

The Green Building Executive Order ([Executive Order S-20-04](#)) established the State's priority for energy and resource efficient high performance buildings. It directs the State to commit to aggressive action to reduce State building electricity usage. One significant measure that is mentioned in this Order is for the State to design, construct, and operate all new and renovated State-owned facilities paid for with State funds as "LEED Silver" or higher certified buildings. LEED - the U.S. [Green Building Council's](#) Leadership in Energy and Environmental Design rating system - is the nation's leading green building rating system. It promotes "high performance" building practices; energy, water and materials conservation; environmentally preferable products and practices; improvements in employee health, comfort and productivity; and reductions in facility operation costs and environmental impacts.

#### **Executive Order S-3-05**

[Executive Order S-3-05](#) established the following greenhouse gas (GHG) emission reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels. The Secretary of the California Environmental Protection Agency is charged with the coordination of the oversight of efforts to achieve these targets, including addressing impacts to water supply, public health, agriculture, the coastline, and forestry.

#### **Federal**

[Title 42 U.S. Code, Sec. 6295](#) contains standards for maximum water use by showerheads, faucets, toilets, and urinals.

### **PERFORMANCE**

Low-flow toilets, urinals, sinks, and shower fixtures; high-efficiency clothes washers, and low water consumption kitchen appliances have been designed to provide equal performance while improving water



use efficiency. When restroom fixtures are equipped with electronic control devices, they provide touch-free operation that reduces contamination and transmission of pathogens.

Manufacturers have developed electronic control devices that power themselves using just water. A rechargeable battery is charged by a micro-turbine driven by water when the faucet is used.

## AVAILABILITY

Manufacturers of all major plumbing fixtures (toilets, faucets, and urinals), most clothes washing machines, and a few kitchen pre-spray nozzles, manufacture water-efficient fixtures and appliances that are available from most plumbing product and appliance distributors. See also [Vendors](#).

## COST

Water-efficient low-flow toilets, urinals, sinks, and shower fixtures; high-efficiency clothes washers, and low water consumption kitchen appliances can return their cost through reduction in water consumption, pumping, and treatment, and in energy used to heat water. For example, in the CUWCC's Rinse & Save Program, the avoided water agency cost for using water-efficient kitchen pre-rinse spray valves was \$65.18 per acre-foot saved. [\[10\]](#)

## SPECIFICATIONS

- Specifications for bathroom fixtures, washing machines, and pre-spray nozzle valves should be consistent with California laws and guidelines.
- The California Department of General Services has developed an acceptance criteria document ([AC M-1](#)) that establishes requirements for zero-water consumption urinal fixtures specified in project construction plans and specifications for installation in California public schools and state-owned buildings under the jurisdiction of the Division of the State Architect.

## VENDORS

### State

- There is a [California Multiple Award Schedules](#) (CMAS) contract with a company that sells water-free urinals. To view this contract, and to determine if other water-efficient products are available through CMAS contracts, visit the CMAS [Product/Service Description](#) Web page and choose "Plumbing-Fixture."
- Information on water use efficiency in the commercial, industrial, and institutional (CII) sectors is available from the California Department of Water Resources' Office of Water Use Efficiency and Transfers.
- See also the [product directories](#) listed in the California Integrated Waste Management Board's (CIWMB) [Sustainable Building Tool Kit](#).

### Other Sources

#### California Urban Water Conservation Council

The [California Urban Water Conservation Council](#) - a non-profit organization - provides information on water-efficient fixtures and appliances.

## SUCCESS STORIES

### **California Urban Water Conservation Council (CUWCC)**

Since 2002, the CUWCC and fourteen participating member water agencies have provided free water-efficient pre-rinse spray valves to restaurants, cafeterias, and other food service facilities. The results of this project are described in the document titled "Rinse & Save: Final Report Summary".

### **Office of Water Use Efficiency and Transfers (OWUET)**

The OWUET has published case studies in efficient water management by businesses. The case studies describe how manufacturers, businesses, government, and institutions can manage water to improve water use efficiency.

## **RESOURCES AND WEBSITES**

### **California Department of Water Resources Office of Water Use Efficiency and Transfers**

Sacramento, CA  
(916) 651-9667

The California Department of Water Resources' Office of Water Use Efficiency and Transfers (OWUET) provide support for the stewardship of California's water resources and energy-efficient use of water. This office is responsible for water use efficiency planning and coordination. Its services include technical and financial assistance, information collection and dissemination, resources evaluation, and implementation. Visit the OWUET's Commercial, Industrial, and Institutional (CII) Program Web site for information on water use efficiency in those sectors.

### **California Urban Water Conservation Council (CUWCC)**

Sacramento, CA  
(916) 552-5885

The California Urban Water Conservation Council was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices into the planning and management of California's water resources.

### **United States Department of Energy Federal Energy Management Program (FEMP)**

Washington, DC  
(800) 363-3732

The FEMP was designed to reduce the cost and environmental impact of Federal agencies by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at Federal sites. See Part VI-Water and Wastewater of the FEMP document titled "[Greening Federal Facilities](#)".

### **United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 564-0624

To promote efficient water use, the USEPA's primary role is to provide technical assistance and information concentrating on 1) improved management practices, 2) better science, 3) effective planning and coordination, 4) market incentives, and 5) public education. See the USEPA's publications on water conservation and efficiency.

### WaterWiser

Denver, CO

(800) 926-7337

Cooperatively run by the American Water Works Association, the USEPA, and the United States Bureau of Reclamation, this site features a clearinghouse of information on water use efficiency and conservation.

[1] California Energy Commission. California's Water-Energy Relationship - Final Staff Report, November 2005, pp. 1, 9. Available at [this location \(PDF file\)](#).

[2] Wisconsin Groundwater Guardian Program, Wisconsin Water and Energy Conservation Project. Energy & Water - What's the Connection? Web page.

<http://www.uwsp.edu/cnr/gwguardian/gwinfo/energy/> (offline).

[3] California Energy Commission. California's Water-Energy Relationship - Final Staff Report, November 2005, p. 1. Available at [this location \(PDF file\)](#).

[4] California Department of Water Resources. California Water Plan Update 2005. Available at <http://www.waterplan.water.ca.gov/>.

[5] United States Environmental Protection Agency. Water Efficiency Web page. Available at <http://www.epa.gov/owm/water-efficiency/index.htm>.

[6] California Urban Water Conservation Council. High-Efficiency Plumbing Fixtures - Toilets and Urinals. Available at this location (PDF file).

[7] California Urban Water Conservation Council. High-Efficiency Clothes Washers Web page. Available at [http://www.cuwcc.org/Efficient\\_Clothes\\_Washers.lasso](http://www.cuwcc.org/Efficient_Clothes_Washers.lasso).

[8] California Urban Water Conservation Council. Rinse & Save: Final Report Summary, Revised February 2005, p. 3. Available at this location (PDF file).

[9] City of Louisville, Colorado. Department of Public Works. Water Conservation Program Residential Washer List Web page. Available at <http://www.ci.louisville.co.us/PublicWorks/washerinfo.htm>.

[10] California Urban Water Conservation Council. Rinse & Save: Final Report Summary, Revised February 2005, p. 11. Available at this location (PDF file).

## Grounds Maintenance (GM)

- [Compost](#)
- [Ice Control for Roads and Walkways](#)
- [Integrated Pest Management - Outdoors](#)
- [Landscape Mulch](#)
- [Plastic Temporary Fencing](#)

## GM – Compost

### Environmental and Health Issues and Recommendations



#### Recycled Content:

Compost can be generated from virgin or postconsumer organic materials. Postconsumer or "recycled content" compost may come from landscape trimmings, agricultural residues, paper pulp, food scraps, wood chips, manure, and biosolids. Using postconsumer or recycled content compost keeps organic material out of landfills.

- State agencies should purchase compost that meets or exceeds the minimum content requirements of the [State Agency Buy Recycled Campaign](#).



### **Material Availability:**

Using recycled content organic materials to make compost offers a beneficial use for what could otherwise be a waste product.



### **Conserves Water:**

Compost helps soil retain moisture, reducing the need for watering. Compost increases rainwater interception and infiltration.



### **Less Hazardous:**

Compost adds beneficial microorganisms to the soil and provides a source of slow-release nutrients which reduces the need for synthetic fertilizers. Compost can suppress a variety of diseases and improves plant health, which reduces the need for pesticides. Compost can also be used to restore contaminated soils, reduce stormwater runoff, and degrade volatile organic compounds (VOCs).

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
  - [Water Conservation](#)
  - [Fertilizers and Pesticides](#)
  - [Stormwater Runoff](#)
  - [Bioremediation](#)
  - [Material to Avoid](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Local Agency Procurement](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

Compost is a soil amendment produced from the controlled biological decomposition of organic materials. Compost feedstock materials include landscape trimmings, agricultural residues, paper pulp, food scraps, wood chips, manure, and biosolids. Compost has the ability to help regenerate poor soils. The composting process encourages the production of beneficial micro-organisms (mainly bacteria and fungi) which in turn break down organic matter to create humus. [\[1\]](#) Compost can:

- Suppress plant diseases and pests.
- Reduce or eliminate the need for chemical fertilizers.
- Promote higher yields of agricultural crops.

- Facilitate reforestation, wetlands restoration, and habitat revitalization efforts by amending contaminated, compacted, and marginal soils.
- Cost-effectively remediate soils contaminated by hazardous waste.
- Remove solids, oil, grease, and heavy metals from stormwater runoff.
- Capture and destroy 99.6 percent of industrial volatile organic chemicals (VOCs) in contaminated air.

## **Environmental and Health Issues**

### **RECYCLED CONTENT**

Purchasing compost made from recycled materials (landscape trimmings, agricultural residues, paper pulp, food scraps, wood chips, manure, and biosolids) conserves landfill space.

**What to look for:** Look for compost that meets or exceeds the minimum content requirements of the [State Agency Buy Recycled Campaign](#).

### **WATER CONSERVATION**

Well-composted organic materials hold a large percentage of their weight in water. Compost improves the plant's ability to draw water from the soil and at a greater depth. At the same time, porosity of the soil is increased, providing a better balance between air and water. Compost helps soils hold water, reduces irrigation requirements, and improves the evapotranspiration of plants by increasing general plant health. Compost also increases rainwater interception and infiltration.

### **FERTILIZERS AND PESTICIDES**

Quality compost provides a source of slow-release nutrients and trace elements which reduces the need for synthetic fertilizers. Since nutrients from compost are slowly made available for root uptake, nutrients are less likely to be lost through leaching. Compost adds beneficial organisms to the soil profile as well. These organisms play a vital role in converting fertilizers into compounds that are easily absorbed by plants. The organic particles provide "sites" for fertilizers to reside until plants can take them up as nutrients. Overall, an organically amended soil is healthier, more resilient, and becomes a pleasure to till or work with your hands.

Compost has also been shown to suppress a variety of plant diseases and to reduce the need for pesticides. Research continues in this area to try and determine exactly what properties of organic matter reduce disease outbreaks. Companies want to develop commercial products that "mimic" this natural disease suppression. This is not easy since each situation is somewhat different and soil temperature, moisture content, and plant selection all play a part in the process.

### **STORMWATER RUNOFF**

Compost improves water infiltration in soils, which can reduce stormwater runoff. Compost has the ability to prevent pollutants in stormwater runoff from reaching surface water. The organic particles also act as a filter to keep fertilizers, pesticides, and other contaminants from leaching into the groundwater supply. The United States Environmental Protection Agency (USEPA) states that compost has also been shown to prevent erosion and silting on embankments parallel to creeks, lakes, and rivers, and prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.

The following California Integrated Waste Management Board (CIWMB) publications describe the benefits of using compost for erosion control:

- [Compost Demonstration Project, Placer County: Use of Compost and Co-Compost as a Primary Erosion Control Material](#)
- [Let's Do Mulch in the Wine Country: Composted Mulch in Hillside Vineyards for Erosion Control, Moisture Conservation, and Weed Suppression](#)
- [Compost Use for Landscape and Environmental Enhancement Manual](#)

## BIOREMEDIATION

The USEPA indicates that the composting process has been shown to absorb odors and treat semivolatile and volatile organic compounds (VOCs), including heating fuels, polyaromatic hydrocarbons (PAHs), and explosives. It has also been shown to bind heavy metals and prevent them from migrating to water resources or being absorbed by plants. The compost process degrades and, in some cases, completely eliminates wood preservatives, pesticides, and both chlorinated and nonchlorinated hydrocarbons in contaminated soils.

The USEPA publication titled "Innovative Uses of Compost - Bioremediation and Pollution Prevention", contains information on the use of compost in soil remediation.

## MATERIAL TO AVOID

Forests can be rich sources of biodiversity. [2] They are important for fish and wildlife habitat; provide food, shelter, and aesthetic and recreational benefits to humans; help slow global warming by storing and sequestering carbon; and help regulate local and regional rainfall. [3] Avoid compost made from fiber, from old growth forests, endangered forests, and unsustainably harvested forests. These terms may be defined differently by different parties, so to err on the safer side, consider purchasing compost generated from 100 percent recycled-content materials, which does not require logging more trees.

## LAWS AND GUIDELINES

### California

#### Statute

- [Public Resources Code \(PRC\) section 42241](#) requires the Department of Transportation to use compost in place of, or to supplement, petroleum-based commercial fertilizers in the state's highway landscape maintenance program.
- [PRC section 42243](#) requires the Department of Forestry and Fire Protection, the Department of Parks and Recreation, and the Department of General Services to initiate programs to restore public lands and use compost, co-compost, rice straw and chemically fixed sewage sludge and use those products or materials wherever possible.
- [PRC section 42246](#) requires any procuring agency that prepares a request for bid for commercial fertilizers or soil amendment products to document its determination that the use of a compost, co-compost, or chemically fixed sewage sludge would jeopardize public health or safety or would jeopardize the intended use of the project.
- [Public Contract Code \(PCC\) section 12183](#) requires all state departments and agencies, including, but not limited to, the Department of Transportation, the Department of Water Resources, the Department of Forestry, and the Department of Parks and Recreation, to give

purchase preference to compost and co-compost products when they can be substituted for, and cost no more than, the cost of regular fertilizer or soil amendment products, or both, if the co-compost products meet all applicable state standards and regulations, as determined by appropriate testing. The product preference is required to include, but not be limited to, the construction of noise attenuation barriers and safety walls, highway planting projects, and reclamation and erosion control programs.

### **State Agency Buy Recycled Campaign (SABRC)**

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on compost, cocompost, and mulch products be spent on products that meet the minimum content requirements set forth in [PCC section 12209](#). [PCC section 12209\(c\)](#) states "For recycled compost, cocompost, and mulch, at least 80 percent of the product shall consist of materials, including, but not limited to, the materials listed in subdivision (c) of Section 12207, that would otherwise be normally disposed of in landfills." **Note: See [PCC section 12207\(c\)](#) for detailed definitions of compost, cocompost, and mulch for the SABRC.**
  - The SABRC compost, cocompost, and mulch category includes mulch, compost, and cocompost products including soil amendments, erosion controls, soil toppings, ground covers, weed suppressants, and organic materials used for water conservation. **Note: See [PCC section 12207\(c\)](#) for detailed definitions of compost, cocompost, and mulch for the SABRC.**
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires compost, cocompost, and mulch purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

### **Federal**

- Since 2000, under federal Executive Order 13148, federal agencies have been required, in implementing landscaping policies, to purchase environmentally preferable and recycled content products, including USEPA-designated items such as compost and mulch that contribute to environmentally and economically beneficial practices.
- The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the USEPA in the [Comprehensive Procurement Guidelines](#) (CPG). Yard trimmings compost and food waste compost are USEPA-designated items. [\[4\]](#) Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable. [\[5\]](#) This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [\[6\],\[7\]](#) The USEPA's [recommended recovered materials content levels for compost made from yard trimmings and/or food waste are available on-line](#).

[Executive Order 13101](#) and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [\[8\]](#)



## PERFORMANCE

In California, commercial composters are required to meet specific regulatory requirements to protect public health and safety. However, because no state or national standards exist for rating compost quality, agencies may need to perform their own quality assessment. Compost should have a pleasant aroma and be consistent throughout. In addition to a visual inspection, assessing other compost characteristics is important to ensure the product meets specific applications needs within a specified price range. The carbon to nitrogen ratio for finished compost should be less than 20. If ratios are too high, nitrogen can be tied up in the compost and unavailable to plants. The pH value of finished compost should be neither extremely acidic nor alkaline (acceptable range: 5.5 - 8.0 pH).

Concerns about physical contaminants in compost such as plastic, glass, and metal, can be addressed by requiring that the product contains no visible contaminants. Weed seeds and pathogens can be a problem unless the material is maintained, using a windrow composting process, at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a period of 15 days or longer, and there is a minimum of five (5) turnings of the windrow. Compost produced by an aerated static pile process, in which all active material is covered with six to 12 inches of insulating material, only requires that these temperatures be maintained for a period of three days.

Once performance requirements are determined (seed germination, erosion control, etc.), it will be easier to select a compost with appropriate characteristics for the application. See the CIWMB publication titled ["Compost: Matching Performance Needs With Product Characteristics"](#) for information on assessing compost products.

Hydroseeding is a good alternative to sod for starting vegetation, especially on steep slopes. However, in many cases, compost blankets offer advantages over hydroseeding. Compost blankets have been found to be better at absorbing heavy rainfall, preventing stormwater runoff, and establishing plants.

## AVAILABILITY

Compost is widely available in small or large quantities from public and private compost producers. Sources of compost and mulch can be found in the yellow pages under such headings as "Rock" and "Landscaping Equipment and Supplies." Some cities, prisons, and colleges also produce and sell compost to offset program operating costs. See the [Vendor](#) section for a link to a partial list of several compost and mulch suppliers in California.

## COST

Compost prices vary based upon a number of factors, such as feedstock, processing required for a given product, and transportation distance to application site. Compost purchased in bulk is considerably less expensive than a bagged product.

Although compost might initially be more expensive to apply compared to commonly-used materials (synthetic fertilizers, straw wattles, silt fences, etc.), compost can offer long-term cost benefits. The use of compost minimizes the need to dispose organic material in landfills, which reduces transportation and disposal costs. Compost builds healthier soils, which reduces the need for fertilizers and pesticides. Compost applied for erosion control can reduce costs related to deposition of sediment on roadways and can help agencies avoid fines for illegal discharge of pollutants into waterways.

### Tips on Buying Compost

Buy compost that meets the requirements of the application type. For example, compost used in nurseries as a soil amendment requires different performance characteristics than compost used in filter socks for erosion control. Remember - it is important to determine the appropriate product for a specific application.

Buy compost from a facility that has obtained all necessary permits, such as a compost handling facility permit issued by the [local enforcement agency](#).

Purchase United States Composting Council (USCC) Seal of Testing Assurance (STA) compost products. The US Composting Council's Seal of Testing Assurance Program requires testing and information disclosure of compost products.

For more information on the various methods for testing compost quality, visit the following Web pages:

- **USCC Test Methods for the Examination of Composting and Compost (TMECC)**
- **USCC Compost Analysis Proficiency Program (CAP)**

## **SPECIFICATIONS**

### **California**

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

The California Department of Transportation (Caltrans) develops [specifications](#) on roadside application of compost for their statewide projects. If you have questions regarding developing specifications for roadside applications, contact the [Caltrans Office of Landscape Architecture](#).

### **Tips for Writing Specifications**

#### ***Sample Language***

It may be useful to contact several local compost suppliers in order to develop specifications that meet the requirements of the application type. The language can specify feedstock type, particle size, moisture content, stability and maturity, pH, maximum contaminant levels, etc. For more information on sample specifications, see the CIWMB fact sheet titled ["Guidelines for Writing Compost or Mulch Procurement Specifications"](#).

#### ***Other Specifications***

- King County Washington Environmental Purchasing Program, Compost as Organic Soil Amendment. This Web page contains information on specifications for road, bridge, and municipal construction for compost products.
- United States Environmental Protection Agency (USEPA), [Database of Environmental Information for Products and Services](#). This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services.
  - If you have a specification for an environmentally preferable product or service, consider asking the [USEPA](#) to include it in this database.

- Washington State Department of Transportation (DOT), Washington State DOT Compost Specifications for Roadside Projects. This document contains compost specifications, including physical criteria and contractor requirements.

## VENDORS

Compost and mulch suppliers can be located by visiting the CIWMB's [Organic Materials Management Facility Search page](#). In addition, the CIWMB's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

## LOCAL AGENCY PROCUREMENT

[Public Contract Code section 10298](#) allows local agencies to participate in State procurement, including agreements for goods and services. The Department of General Services (DGS) [Master Agreements](#) Web page contains information on such programs as the Master Agreements and Statewide Contracts and California Multiple Awards Schedules. These programs specifically offer a vast array of goods and services that a particular local agency may not have the expertise in procuring.

## SUCCESS STORIES

### City of San Jose, CA

The City of San Jose has adopted policies that have boosted compost sales by city agencies, as described in a December 2000 article in BioCycle titled ["Increasing Government Purchase of Compost Products"](#).

### Texas Department of Transportation

The Texas Department of Transportation (TxDOT) runs one of the most advanced, widespread compost-use programs in the United States and has conducted more than 20 demonstrations across the state proving the benefits of compost. The [USEPA GreenScapes](#) Web page provides information on TxDOT's partnership with the Texas Natural Resources Conservation Commission (TNRCC) and their efforts to increase compost procurement.

### Case Studies

#### [Avenal State Prison: Food Scrap and Green Material Collection](#)

This case study describes how Avenal State Prison's (located in California) contracted food scrap and green material collection program diverts organic materials from disposal, reduces its disposal and landscape maintenance costs, and produces a value-added product from recovered organic materials.

#### [Cal Poly San Luis Obispo: Food Scrap and Green Material](#)

This case study describes how the California Polytechnic State University (Cal Poly), San Luis Obispo, implemented several programs that divert both green material and food scraps from landfilling. As a result of these programs, the campus has little material that is actually landfilled, makes \$30,000 in annual revenue from compost sales, decreases pollution from animal waste runoff, reduces landfill greenhouse gas emissions, and conserves landfill capacity.

#### **City of Burbank: Green Material Collection Program**

This case study describes how the City of Burbank, California partnered with its hauling company and a grower to implement a highly successful green material diversion and composting public education program. This has resulted in adding nutrient value to sandy agricultural soils, producing 500 pounds of compost a year from 4,000 backyard compost projects, and extending the 50-year life expectancy of their landfill.

#### **City of Modesto: Public Compost Production Program Study**

This case study describes how the City of Modesto's (California) composting facility has enabled the city to divert green material and biosolids from disposal, thereby saving more than \$1.4 million on the cost of landfilling their organic materials and generating revenues through the sale of the compost products which help to offset program operating costs.

### **RESOURCES AND WEBSITES**

#### **Association of Compost Producers (ACP)**

(619) 303-3694

The ACP is a non-profit organization whose members are public agencies and private companies involved in the production and marketing of compost. The purpose of the association is to help members work together to improve the quality of soil being used for gardens, landscaping and farming.

#### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the CIWMB's [Organic Materials Management -- Compost and Mulch](#) Web pages.

#### **California Organic Recycling Council (CORC)**

Sacramento, CA

(916) 441-2772

The CORC represents a coalition of organics recyclers, including collectors, processors, end users, and local governments. The CORC supports the development of an organics infrastructure for increasing sustainable and diverse end markets, through policy leadership and education. The CORC provides educational workshops, expert testimony and comments on legislation and regulations, and is a resource for organic materials recycling programs.

#### **US Composting Council (USCC)**

Holbrook, NY 11741

(631) 737-4931

The USCC is the only national organics recycling organization dedicated to the development, expansion and promotion of the composting industry.

#### **King County Environmental Purchasing Program**

Seattle, WA

(206) 296-0100

(800) 325-6165

A pioneer and contemporary model in environmental procurement, King County provides sample contract specifications for compost and landscape mulch, and information on a variety of other products. In addition, its Web site contains procurement case studies along with resources for environmental purchasing and waste reduction.

**The Office of the Federal Environmental Executive (OFEE)**

Washington, DC

(202) 564-1297

As part of its broader mission to promote sustainable environmental stewardship throughout the federal government, the OFEE promotes the acquisition of recycled-content, environmentally preferable, and biobased products.

**United States Conference of Mayors**

Washington, DC

(202) 293-7330

The United States Conference of Mayors is the official nonpartisan organization of the nation's cities with populations of 30,000 or more. Their Web site contains many articles on compost.

**United States Environmental Protection Agency (USEPA)**

Washington, DC

(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products such as compost. Visit the USEPA's [Comprehensive Procurement Guidelines](#) (CPG) Web site for Recovered Materials Advisory Notices (RMANs), which recommend recycled-content levels. The site includes information on landscaping products, such as [compost made from yard trimmings and/or food waste](#) and a fact sheet on procurement guidelines for landscaping products.

**Laboratories**

For assistance with finding laboratories that have expertise in testing compost, visit the USCC's Web site and see the California Integrated Waste Management Board publication titled ["Compost: Matching Performance Needs With Product Characteristics"](#). \* *Reference does not imply endorsement by the California Integrated Waste Management Board.*

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[1] United States Environmental Protection Agency. Composting - Environmental Benefits Web site. Available at [www.epa.gov/epaoswer/non-hw/composting/benefits.htm](http://www.epa.gov/epaoswer/non-hw/composting/benefits.htm).

[2] United States Environmental Protection Agency. Technical Document: EPA's Draft Report on the Environment 2003, p. 5-9. Available at [http://www.epa.gov/Envindicators/roe/pdf/EPA\\_Draft\\_ROE.pdf](http://www.epa.gov/Envindicators/roe/pdf/EPA_Draft_ROE.pdf).

[3] Union of Concerned Scientists. Invasive Species - Forests Web page. Available at [www.ucsusa.org/invasive\\_species/forests-index.html](http://www.ucsusa.org/invasive_species/forests-index.html). Accessed on January 12, 2006.

[4] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines EPA Expands Comprehensive Procurement Guideline (CPG) fact sheet. Available at [www.epa.gov/cpg/pdf/cpg-fs.pdf](http://www.epa.gov/cpg/pdf/cpg-fs.pdf).

[5] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Landscaping Products fact sheet. Available at [www.epa.gov/cpg/factshts.htm](http://www.epa.gov/cpg/factshts.htm).

[6] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.

[7] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Landscaping Products fact sheet. Available at: [www.epa.gov/cpg/factshts.htm](http://www.epa.gov/cpg/factshts.htm).

[8] Ibid.

## **GM – Ice Control for Roads and Walkways**

### **Environmental and Health Issues and Recommendations**



**Less Hazardous:**

When possible, reduce the use of products that contain high levels of chlorides, which could pose health risks to employees and the environment.

Highly corrosive materials should also be avoided as much as possible in order to prevent damage to application equipment and bridge structures.



**Prevents Waste:**

Non-chloride de-icers are less corrosive than water, helping to preserve structures, vehicles, and clothing.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Story](#)
- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

In the 1980s, environmental issues and the demand for better performance helped contribute to rapid changes in the de-icing industry. Many alternative de-icing products have been developed and are now available.

## LAWS AND GUIDELINES

### California

#### **Statute**

Chapter 318, Statutes of 1991 (Hauser, AB 220) required that the use of salt (sodium chloride) on state highways be reduced from the yearly average use from 1976 to 1988 (15,000 tons) or replaced with an environmentally safe de-icing method. See also [California Streets and Highways Code section 95.6](#).

#### **Policy**

### **California Department of Transportation (Caltrans) Policy on Snow and Ice Removal from State Highways**

"Snow removal and ice control shall be performed as necessary in order to facilitate the movement and safety of public traffic and shall be done in accordance with the best management practices outlined herein with particular emphasis given to environmentally sensitive areas." [\[1\]](#)

## PERFORMANCE

### Sidewalks, Walkways, and Bridge Decks

Potassium acetate and magnesium chloride are liquids that are reliable choices for areas such as sidewalks, walkways and bridge decks. On sidewalks and walkways, these products should be used with a fine sand to reduce slipperiness. On road and highway bridge decks, these liquids are applied with or without traction enhancing sand or other abrasives.

Although these products contain chlorides that may be damaging to plants in large quantities, they are less damaging than sodium chloride when applied properly. Ease of application is the main benefit of using these products.

### Roads and Highways

Potassium acetate, magnesium chloride, and calcium magnesium acetate (CMA) are all acceptable substitutes for salt (sodium chloride). The two liquids, potassium acetate and magnesium chloride, can be applied directly to the roadway surface or used to pre-wet abrasives as they are applied from a truck. CMA is normally applied as a dry product, although it has been used successfully made into brine. The primary advantage of these types of products is their ability to act as a catalyst for dry sodium chloride. They tend to increase the efficiency of sodium chloride, thereby reducing the actual amount that needs to be applied. Salt brine has also been used successfully as a pre-wetting agent for abrasives and dry sodium chloride.

## AVAILABILITY

Salt (sodium chloride) is the most readily available product. California buys solar evaporated salt as well as mined enhanced salt products. Liquid magnesium chloride is readily available as it is also used as a dust palliative. There has been little or no production of CMA for the past few years.

## COST

Salt (sodium chloride) and similar products that are primarily chloride-based are initially cheaper to buy than alternative products. However, the long-term costs increase when infrastructure replacement of concrete and metal surfaces is taken into consideration.

### Tips on Buying Deicing Products

Lower your de-icer budget by buying in large quantities if possible. For highways, stockpiling de-icers in well designed storage facilities can produce significant cost savings.

Use a [statewide contract](#) where available to secure cost savings. Using a contract produced by competitive bidding generally results in cost savings as well as providing protection from price increases due to market fluctuations.

## SPECIFICATIONS

### California

The [Procurement Division](#) of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. The current specification for de-icing salt is incorporated in statewide [contract #1-04-68-10 Rev. F](#).



## VENDORS

### Statewide Contract

Several successful bidders are listed in the statewide contract. Note: This contract might not contain products with the environmental attributes that are discussed in this section.

### Other Vendors

Products other than sodium chloride are purchased in smaller quantities from a variety of vendors not listed on the statewide contract.

## SUCCESS STORY

See the [Ice Control for Roads and Walkways](#) section of the Environmentally Preferable Purchasing Guide published by the Solid Waste Management Coordinating Board of Minnesota.

## RESOURCES AND WEBSITES

### [California Department of Transportation](#) (Caltrans)

See the Caltrans Division of Maintenance, Road Information, [Snow and Ice Control Program Web page](#).

### [Minnesota, Solid Waste Management Coordinating Board of](#) (SWMCB)

The mission of the SWMCB is to increase the efficiency and environmental effectiveness of the region's solid waste management system. See the [Ice Control for Roads and Walkways](#) section of the SWMCB's Environmentally Preferable Purchasing Guide.

### [The Salt Institute](#)

Fairfax Plaza, Alexandria, VA  
(703) 549-4648

The Salt Institute is a source of information about salt and its more than 14,000 known uses. The Salt Institute is a non-profit association of salt producers (manufacturers).

### [United States Environmental Protection Agency](#) (USEPA)

Washington, DC  
(202) 272-0167

The USEPA's [Planning Considerations for Roads, Highways and Bridges](#) Web page discusses the storage and application of de-icers.

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[1] California Department of Transportation. Division of Maintenance, Road Information, Snow and Ice Control Program Web page. Available at <http://www.dot.ca.gov/hq/roadinfo/snwice.htm>. Accessed on July 25, 2006

## GM – Landscape Integrated Pest Management: Gardens, Turf, Roadsides, Rights-of-way

### Environmental and Health Issues



#### **Less Hazardous:**

Train grounds workers in integrated pest management (IPM) and how to prevent pest problems without resorting to routine spraying of herbicides, insecticides, or fungicides. Improper use or disposal of some pesticides may result in contamination of water bodies, groundwater, or sewage effluent.



#### **Water Quality:**

IPM can result in fewer and less toxic chemicals contaminating surface and ground water. Pollution from runoff is called nonpoint source pollution and includes landscape sources such as storm water and agricultural runoff, and dust and air pollution that find their way into water bodies. [\[1\]](#)

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background](#)
- [Environmental and Health Issues](#)
- [Components](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)
- [Glossary](#)

## **BACKGROUND**

This section covers integrated pest management (IPM) for landscapes, a broad category that includes gardens, turf, roadsides, and rights-of-way, and planted areas surrounding buildings [\[2\]](#). IPM is an approach that focuses on long-term prevention of pests and is widely used by public agencies and school districts throughout California. In this section, a pest is defined as a plant or animal found in the wrong place-which means that weeds are pests as well as plant diseases, aphids, yellowjackets, or gophers. The companion section on structural IPM considers some outdoor pests [\[3\]](#), but its focus is on pests that enter buildings rather than those found among or on landscape plants.

Other sections within the Environmentally Preferable Purchasing Best Practices Manual overlap with this section. [Compost](#) may suppress some plant diseases and reduce the need for pesticides. Use of landscape mulch helps manage weeds, reducing or eliminating herbicide use. Mulch adds nutrients to soil, leading to healthier plants, and reduces the need for fertilizers and pesticides.

**Are herbicides considered pesticides?** A [pesticide](#) (PDF, 86 KB) is any substance intended to control, destroy, repel, or attract a pest. Pesticides include herbicides, fungicides, insecticides, rodenticides, and even naturally occurring, pest-destroying organisms such as *Bacillus thuringiensis*. Botanical products that contain food-grade ingredients such as clove or mint oil are pesticides. Some fertilizers-for example, the weed-and-feed type-are considered pesticides and have a label with a United States Environmental Protection Agency (U.S. EPA) registration number.

**In-house grounds workers vs. contractors.** State agencies in California use both in-house and contracted grounds workers. The [Department of Pesticide Regulation](#) (DPR) regulates the landscape maintenance industry, and certifies or licenses those who apply pesticides for hire. Any landscape maintenance or pest control contractor who applies pesticides (including herbicides) must have a valid business license issued by DPR. Whether in-house or contractor, the applicator must hold a certificate ([Qualified Applicator Certificate or QAC](#)) or license ([Qualified Applicator License or QAL](#)) [4]. In addition, some landscape professionals are agricultural pest control advisers (PCA), who may offer recommendations on pesticide use for parks, golf courses, and rights-of-way. For more detailed information on licensing, see [DPR's Licensing and Certification Web page](#).

**IPM Practices in California's Schools.** Since 1993, the [California Department of Pesticide Regulation](#) (DPR) has worked with school districts in the State to provide [information about IPM](#). During this time, a few innovative districts developed their own IPM programs. In the 1990s, a few herbicide-misuse episodes took place in California schools, resulting in the Healthy Schools Act of 2000. This new law put into place right-to-know requirements such as notification, posting, and record keeping for pesticides used at California's K-12 public schools. The law also encourages use of IPM practices that are safer for school environments, ultimately reducing children's exposure to pesticides.

## ENVIRONMENTAL AND HEALTH ISSUES

**Pesticide toxicity.** Two different pesticide products may contain the same active ingredient, the part of the pesticide that kills the pest, but yet differ in toxicity. Acute toxicity results from a single dose or short-term exposure of a substance, and chronic toxicity by repeated small doses over a long time. U.S. EPA assigns signal words (danger, warning, caution) by level of acute toxicity.

**Pesticide exposure.** People can be exposed to chemicals by inhalation or through their skin, mouth, nose, or eyes. Exposure is intensified when a chemical volatilizes (evaporates), which is why most reported pesticide mishaps outdoors result from applications of liquid pesticides. The volatilizing pesticide doesn't have to be toxic to cause an allergic reaction or asthma—even some botanical products can cause problems if label directions are not followed.

**Contamination of water.** When lawns or plants are treated with pesticides, irrigation or rain may convey the pesticides from concrete or asphalt into [storm drains](#), which in most of California drain untreated directly to surface water. Studies have shown that urban sources of pyrethroid insecticides can enter surface water such as creeks and streams, where minute quantities kill native aquatic organisms. Pyrethroids are popular as commercial and residential perimeter sprays (see Structural IPM), and are also used in some plant sprays and weed-and-feed products. Examples include products containing bifenthrin, deltamethrin, lambda cyhalothrin, and permethrin. The active ingredients in herbicides, or even inert ingredients that help the herbicide stick to plant leaves, may also contaminate [ground water](#) (PDF, 100 KB) and surface water [5]. As protection for endangered salmon and steelhead habitat, a 2004 [federal court order](#) established buffer zones adjacent to water bodies in California, Oregon, and Washington for application of 33 different pesticidal active ingredients, including several herbicides.

## COMPONENTS

An IPM program for landscaping combines several steps to limit weed growth and prevent infestations of insects, rodents, and other pests. Here are the steps recommended by landscape experts:

- **Prevent pest problems** by designing a landscape that's unappealing to pests. For example, plant pest-resistant or well-adapted plant varieties such as native plants. Make sure that plants are matched to the irrigation system or climate. Consider the specifics of your situation, because

suppressing one pest may increase another. Thick ground covers will prevent weed growth, but they're also ideal rat habitat. Composting will reduce green waste, but in areas where rats thrive, you'll have to enclose the compost. [Mowing strips and underlayments](#) [6] can reduce herbicide use because weeds no longer grow in inaccessible areas-under benches, for instance-and can easily be mowed (see [mechanical control](#) below).

- **Identify the pests and symptoms** so you know how to proceed. You wouldn't want to spray a rosebush covered with hover fly larvae, which resemble small green slugs and devour aphids, not plants. Common pest problems include [insects](#), [mites](#), [snails and slugs](#), [plant diseases](#), [vertebrates](#), [abiotic disorders](#) such as nutrient deficiencies, [weeds](#), and [nematodes](#).
- **Survey (monitor) for pests** on a regular basis. Look for conditions that encourage pests such as chronic under- or overwatering, over fertilizing, incorrect pruning such as topping, and plant injuries.
- **Decide what's an acceptable level** for each pest and at what point you need to take action. For example, you might allow aphids to build up on plants on an embankment, knowing that natural enemies will soon follow and eliminate most of the aphids. However, for aphids that infest trees in parking lots, walkways, or along thoroughfares, and have no obvious natural enemies, you would want to take action as soon as possible. (See example of Asian woolly hackberry aphid below.)
- **Use practices** that effectively manage the pest, and that pose the least risk to human health and the environment. Some of these practices are mentioned below.

## Types of Preventive Practices

**Cultural control** includes selection of disease-resistant plant varieties; proper irrigation, fertilization, and pruning; and planting at the right time of year.

When you use a **physical control** you change physical conditions-temperature, light, or humidity-to prevent pest problems. Examples include landscape fabric to shade out weeds and pruning dense plants to allow better air circulation and thus prevent disease.

With **mechanical control**, pests are managed through manual labor or simple objects, devices, or equipment such as using handheld propane flaming units that cook weeds, installing mowing strips and underlayments, and fastening copper bands around tree trunks or planters to exclude snails and slugs.

**Biological control** is the use of [beneficial organisms](#) (also known as natural enemies) to reduce pest populations. Beneficial organisms include parasitic insects (usually tiny wasps) [7] and predaceous insects, mites, and spiders; bats; birds; amphibians and reptiles. Just about every pest has at least one natural enemy that keeps its population in check. Trouble arises when a pest escapes its natural enemies by arriving in a new environment. One example is the [ash whitefly](#). In 1988, this whitefly spread throughout California and soon covered urban trees such as ash and ornamental pear. Scientists from the California Department of Food and Agriculture traveled to the ash whitefly's ancestral home in Italy, where they located a wasp that readily parasitizes immature ash whiteflies. Within two years of its release, the wasp drastically reduced the ash whitefly population. Biological control is superior to foliar pesticide sprays for managing ash whitefly and similar pests such as scale insects and mealybugs.

**Chemical control** may be necessary if an emergency arises or a pest population must be reduced quickly. Reduced-risk pesticides don't endanger living organisms or the environment. Ideally, they break down easily, have narrow specificity, do not kill natural enemies, and do not volatilize around people. Examples of reduced-risk pesticides used for landscaping include the microbial insecticide, *Bacillus thuringiensis*, herbicides and insecticides that contain mint or clove oil, potassium bicarbonate for plant mildews, horticultural oil for sucking insects, and if absolutely necessary, spot-sprayed conventional herbicides.

**What about emergencies?** What if, despite excellent preventive care, there's a sudden infestation of mystery bugs on trees surrounding a parking lot? You would want to make sure you correctly identify the pest and inspect other trees for the bugs.

In 2002, the [Asian woolly hackberry aphid](#), previously unknown in California, suddenly blanketed Chinese hackberry trees in many parts of the state. Honeydew from the aphids' feeding dripped onto cars and made a sticky mess on asphalt and pavement. It took two growing seasons before experts figured out good management strategies. They recommend first identifying the aphid to avoid confusing it with the citricola scale, which also produces honeydew. Next, they recommended using cultural controls such as limited irrigation and fertilizer-and when necessary, soil drenches of a reduced-risk systemic insecticide. What about biological control? So far, natural enemies for the hackberry aphid haven't been introduced into California.

## **LAWS AND GUIDELINES**

### **California**

#### **Statute**

Existing State law ([AB 2472](#), Chapter 242, Statutes of 2003) (PDF, 9 KB) provides that it is the policy of the State to protect public health and safety in a manner that complements sustainability as an extension of resource conservation. It also states that the safe handling, reduction, or elimination of pesticide use in state buildings and on state lands is an important step in providing all state employees and members of the public with a safe, healthy environment.

Since 1993, the [California Department of Pesticide Regulation](#) (DPR) has worked with school districts in the State to provide [information about IPM](#). During this time, a few innovative districts have developed their own IPM programs. In 2001, the enactment of the Healthy Schools Act of 2000 (PDF, 20 KB) put into place right-to-know requirements such as notification, posting, and record keeping for pesticides used at California's K-12 public schools. The law also encourages use of IPM practices that are safer for school environments, reducing children's exposure to pesticides. Misapplications of herbicides spurred this legislation, so many districts are interested in herbicide alternatives for gardens and turf.

#### **Ordinances, Resolutions, Programs, and Policies**

Since 1995 several California cities and counties have passed ordinances and established policies that require the use of IPM on public property.

The [City of Santa Monica](#) developed a structural IPM program in 1995 and a landscape IPM program in 1998. Pesticides used on city property are regulated. Early efforts eliminated broadcast applications of herbicides in all city parks and sports fields, and pilot pesticide-free zones in certain city rights-of-way and parks were established. An ordinance passed in 2004 requires [less runoff](#) to Santa Monica Bay through increased permeable surfaces such as found in landscaped areas.

In 1996, the City and County of San Francisco enacted an ordinance to regulate and reduce the use of pesticides on city property by city departments, agencies, and contractors. The ordinance prohibits use of certain pesticides including carcinogens and reproductive toxins, and requires the posting of notices and contact information to inform the public whenever a pesticide is used on city property. See [Success Stories](#) for details about specific pest management practices.

The [City of Santa Barbara](#) (PDF, 358 KB) adopted a resolution in June 2003 that emphasizes planning, design, and installation to minimize pest problems of landscapes, facilities, or road rights-of-way. Each City department must appoint an IPM coordinator who reviews project plans to make sure that the design uses IPM strategies. The design considers soil types, grading and slope, the water table, drainage,

proximity to sensitive areas, selection of vegetation, and vector-control issues [\[8\]](#). City grounds designers, planners, managers, crews, and their contractors give priority to IPM strategies when designing new and renovating existing landscaped areas.

## Federal

In 1994, a presidential memorandum, "[Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds](#)," emphasized using regionally native plants and landscape practices that conserve water and prevent pollution. According to the memorandum, pollution prevention could be achieved by reducing fertilizer and pesticide use and using IPM practices, recycling green waste, and minimizing runoff.

## PERFORMANCE

On golf courses, where aesthetic standards are high, elimination or even reduction of herbicides is difficult. Yet, at the popular Presidio Golf Course in San Francisco, grounds staff spray compost tea, a mixture of compost and water, onto golf course greens and landscapes in place of synthetic fertilizers. The healthier turf and landscape are then better able to resist disease. Since 2000, the golf course has steadily reduced overall pesticide use and currently uses approximately 98 percent less pesticide than private Bay Area golf courses. [\[9\]](#)

Santa Barbara County's Parks Department reduced herbicide use by mulching with wood chips and using mechanical practices such as mowing and weed whipping. The Department purchased a device that kills weeds by squirting them with water heated to 2,800 degrees Fahrenheit. This device has been used in several County Park open spaces, and although time-consuming to use, effectively manages weeds.

## AVAILABILITY

California does not yet provide special certification for landscape maintenance businesses with staff trained in IPM practices, but in 2007, draft standards will form the basis of a pilot certification program for landscape IPM. Refer to [Specifications](#) for tips on selecting knowledgeable and experienced IPM professionals.

## COST

Most public agencies that have switched to an IPM approach have reduced their costs after initially paying more during a transition period. IPM can reduce costs by eliminating regular pesticide spraying, but those costs are redirected toward preventive practices, such as training employees, inspecting for pests, and investing in landscaping improvements. Improving irrigation systems or purchasing new equipment may cost more up front, but will lower costs in the long run.

When gardeners at [Seattle University](#) (PDF, 3,520 KB) stopped using landscape pesticides in 1986, they installed ground cover plants to outcompete weeds. After three years, the ground covers grew in and saved the 48-acre university \$1,300 annually, mostly by reducing costs of chemical inputs, soil loss due to erosion, and equipment maintenance. The university continues to use a wide range of innovative practices.

The California Department of Transportation (Caltrans) compared costs for various roadside treatments along road edges (see [Success Stories](#) below). Planting native vegetation along road edges or medians costs up to tenfold less (\$1-\$10/m<sup>2</sup>) than installing asphalt concrete pavement (\$20-\$80/m<sup>2</sup>), aggregate base (\$10-\$35/m<sup>2</sup>), patterned concrete (\$35-\$80/m<sup>2</sup>), or stamped asphalt (\$25-\$45/m<sup>2</sup>). In transitional, rural, and natural areas where native vegetation is suitable, plants will last 15 to 20 years.



## SPECIFICATIONS

### California

#### *Sample Language*

Thorough specifications help eliminate low bidding by firms unwilling to use an IPM approach. The City of Santa Monica requested vendors to demonstrate their qualifications by submitting the following information:

- Résumés of service technicians or relevant subcontractors who will be on site to service the account or supply technical support.
- A description of experience in the design or implementation of IPM programs (including specifics about the types of equipment and products used to control pests).
- A list of clients receiving IPM service from the company.
- A description of training provided to clients.
- A summary of all regulatory inspections and violations in the past five years and the company's response to any violations.

#### *Examples*

**Alameda County** supports a [Bay-Friendly Landscape Program](#) that ideally mimics natural systems through recycling of water, debris, and nutrients. Bay-Friendly gardening emphasizes local climate and soil conditions, and uses plants adapted to those conditions. The landscape specifications follow the Bay-Friendly Landscape principles and practices to specifications for bidding and contract development.

**Santa Barbara County's** IPM Strategy (PDF, 177 KB) advises the interdepartmental grounds management committee to review and revise procurement practices.

[Various cities and counties in California](#). During 2006, cities and counties in the San Francisco Bay area and part of the Sacramento Valley will compile sample contract language for structural and landscape IPM that includes requests for proposals or qualifications, and specifications.

## VENDORS

See [Availability](#)

## SUCCESS STORIES

### **California Department of Transportation (Caltrans) - Roadside Management Toolbox**

In 1992, Caltrans adopted an integrated vegetation management (IVM) program for its 15,000 miles of highways and 230,000 acres of right-of-way land. The IVM program began as a way to cut down on manual, mechanical, and chemical highway maintenance for both economic and environmental reasons. The [Roadside Management Toolbox](#) combines treatment categories such as road edges and medians with treatment details that include irrigated vegetation, native vegetation, fiber and rubber weed-control mats, and gravel and organic mulch.

### **City and County of San Francisco, California**



As part of San Francisco's Pesticide Program, City staff receives extensive training in alternative practices for managing pests, and use tools such as handheld flaming units that cook weeds, containerized baiting systems, insect growth regulators, weed fabric, and mulches. One of San Francisco's departments, the [San Francisco Public Utilities Commission](#), manages extensive watershed right-of-way lands across Northern California. As part of the Commission's comprehensive IPM program for steep areas in the watershed, goats clear away poison oak and other weeds. The Department of Public Works plants native wildflowers in the median strips that divide San Francisco streets. The wildflowers outcompete weeds until permanent plantings are installed.

### **Marin County, California**

Successful implementation of IPM programs by [Marin County](#) departments has resulted in significant reduction in pesticide use. The County Department of Agriculture established a Weed Management Area where pest weeds are removed mechanically, and biological control agents are released to keep weed populations low.

### **State of Washington-Seattle University**

In 1979, Seattle University adopted a landscape IPM program and has successfully maintained the 48-acre campus since 1986 without using any pesticides. Grounds staff use a combination of practices that promote soil fertility. Other practices include appropriate plant selection, using nonchemical weed suppression, mulching, cycling nutrients, grasscycling, using mycorrhizal fungi, fertilizing with compost and compost tea, and releasing beneficial insects.

## **RESOURCES AND WEBSITES**

### **Pesticides and IPM**

#### **[California Department of Pesticide Regulation](#) (DPR)**

Sacramento, California

(916) 445-4300

Central Contra Costa Sanitary District. 2004. Pesticides and Water Quality . Our Water Our World, 2-page fact sheet.

### **Pest Management References**

See University of California IPM Online Resources: [How to Manage Pests: Pests in Landscapes, Gardens, and Turf](#).

Costello, Laurence. 2003. [Abiotic Disorders of Landscape Plants](#). University of California Division of Agriculture and Natural Resources. Oakland, Calif. Provides information on disorders caused by environmental, physiological or other nonbiological factors.

Dreistadt, Steve. 2004. [Pests of Landscape Trees and Shrubs](#), 2nd edition. University of California Division of Agriculture and Natural Resources. Oakland, Calif. Comprehensive guide to IPM of landscape plants.

### **Habitat Restoration**

#### ***Native plants***

U.S. EPA. 1997. A Sourcebook on [Natural Landscaping for Public Officials](#). A guide to replacing conventional lawns and gardens with natural landscaping. Focuses on Great Lakes and Midwestern

United States. Project initiated because of 1994 [presidential memorandum](#), "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds."

Rubissow Okamoto, A. 2005. [Bringing back native grasses](#). CalFed Bay-Delta Science Program.  
Sawyer, J.O., Jr. and T. Keeler-Wolf. 1997. [A Manual of California Vegetation](#). Published as a book and an online version by the [California Native Plant Society](#) and botanists from academia, conservation organizations, environmental consulting companies, and state and federal agencies.

California State Parks. 2002. [Vegetation mapping](#): A primer for the California State Park System (PDF, 166 KB). A 54-page guide prepared by Roy A. Woodward that introduces State Park planners and ecologists to vegetation mapping.

### ***Roadsides***

Although hedgerows often serve as buffers between roadsides and farmland, they are appropriate for other borders, and help suppress weeds, control erosion from wind and water, and attract beneficial insects. Another useful guide is Hedgerows for California Agriculture-A Resource Guide (2004) by Sam Earnshaw, Community Alliance with Family Farmers.

### ***Invasive plants***

Weed Management Areas, California Department of Food & Agriculture.

### ***Mowing Strips and Underlayments***

Ard, Jeff. 1999. Fundamentals of a Low-Maintenance, Integrated Pest Management Approach to [Landscape Design](#). IPM Associates, Inc.

### ***Golf Courses***

United States Golf Association. The environmental principles for golf courses in the United States. A set of principles developed by a group of leading golf and environmental organizations that advocate environmental responsibility in golf course planning and siting, design, construction, maintenance and facility operations.

Audubon International - Environmental Management Practices for Golf Courses. 2006. The Audubon Cooperative Sanctuary Program for Golf Courses helps superintendents and golf industry experts establish environmentally sustainable golf courses. A checklist describes how to set up wildlife habitat, establish native plant communities, and implement IPM practices.

## **GLOSSARY**

**QAC or Qualified Applicator Certificate.** Silver card. Any person who uses or supervises the use of federally restricted use pesticides or State restricted materials for any purpose or on any property other than that provided by the definition of "private applicator" [Title 3, [California Code of Regulations](#) (CCR), section 6000]. This certificate is also required by anyone who is in the business of landscape maintenance and performs pest control that is incidental to such business. In this situation, the Qualified Applicator Certificate (QAC) holder would have to possess the Landscape Maintenance Pest Control Category on their certificate, and obtain a Maintenance Gardener Pest Control Business License.

**QAL or Qualified Applicator License.** Brown card. Any person who supervises the pesticide application (restricted-use and/or general-use pesticide) made by a licensed Pest Control Business and is responsible for the safe and legal operation of the pest control business [California Food and Agricultural Code (FAC) sections [11701-11709](#)] or any person who uses or supervises the use of a federally

restricted-use pesticide or state-restricted material for any purpose or on any property other than that provided by the definition of "private applicator" (3 [CCR](#) section 6000).

**PCA or Agricultural Pest Control Adviser.** Green card. An Agricultural Pest Control Adviser License is required by any person who offers a recommendation on any agricultural use, who holds himself or herself forth as an authority on any agricultural use, or who solicits services or sales for any agricultural use (FAC sections [11410](#), [11411](#)). Agricultural use includes commercial production of animals or plants (including forests), parks, golf courses, cemeteries, roadside, power line rights-of-way, and nurseries. Any landscape architect who includes pesticide use recommendations in landscape architectural plans must be licensed as a PCA, unless the recommendations are made for houses, offices, shopping centers, and other similar settings. PCA licensing is required for pesticide use recommendations for parks and recreational areas, golf courses, cemeteries, parkways, highways, and other similar settings.

[1] California Water Resources Control Board, Water Quality, Accessed on 10-6-06. Available at: <http://www.waterboards.ca.gov/>

[2] This section also includes fencelines, sidewalks and walkways, parking islands, landscape boxes and beds, landscaping adjacent to buildings, hardscaped play surfaces, parking areas, and creeks and riparian restoration areas.

[3] The oriental cockroach is a structural pest that lives outdoors. This roach, widespread in California, makes its home in damp, underground utility and valve boxes. The roaches are usually managed by pest control operators rather than landscape professionals.

[4] An exception to this rule exists in **public schools** where grounds staff do not have to be certified or licensed unless they apply federally restricted-use pesticides such as aluminum phosphide. Only a person holding a QAC or QAL plus a permit issued by the county agricultural commissioner may apply State-listed restricted-use pesticides. Some school districts require that all pesticide applications be supervised or performed by certified or licensed applicators. A pest control business license is required of any person or company performing pest control for hire.

[5] A study published by Rick Relyea of University of Pittsburgh in 2005 showed tadpole mortality from an inert ingredient, polyethoxylated tallow amine (POEA), in some formulations of the herbicide, glyphosate. Inert ingredients are not listed on the pesticide label, but make up most of the pesticide product. POEA serves as a surfactant, helping the sprayed material penetrate leaves.

[6] Mowing strips are hard surfaces such as concrete or brick that border turf and enable mowers to maneuver more freely. Underlayments refer to a hard surface underneath or surrounding the base of a landscape feature located in a turf area (e.g., benches, tables, signs, bicycle racks, fencelines).

[7] In the insect world, the word "parasite" can mean either true parasites such as fleas, or parasitoids, which include thousands of species of [tiny](#) wasps. (These wasps do not resemble yellowjackets or hornets, and they don't sting people or any animal besides their host.) Parasitoids ultimately cause the death of their host by laying one or more eggs in its body. As the young parasitoid matures within the host, it eats the host from the inside out and finally emerges as an adult. A number of variations on this theme exist—for example, some parasitoids lay their eggs in their hosts' eggs, while others pursue the larval or adult stage.

[8] For example, the tendency of a marshy area to encourage mosquito breeding.

[9] <http://www.presidio.gov/Projects/Sustainability/IPM/> (offline). Accessed Summer/Fall 2006.

## GM – Landscape Mulch

### Environmental and Health Issues and Recommendations



#### Recycled Content:

Mulch can be generated from virgin or postconsumer organic materials. Postconsumer or "recycled content" mulch comes from landscape trimmings, agricultural prunings, and source-separated

construction and demolition materials that have been collected through recycling programs. Using recycled content mulch keeps waste out of landfills.

- " State agencies should purchase mulch that meets or exceeds the minimum content requirements of the [State Agency Buy Recycled Campaign](#).



#### **Material Availability:**

Using source-separated construction and demolition materials, agricultural residues, tree prunings, and landscape trimmings to make mulch offers a beneficial use for what could otherwise be a waste product.



#### **Conserves Water:**

Mulch helps hold soil moisture, reducing the need for watering.



#### **Less Hazardous:**

Mulch controls weeds, reducing or eliminating the need for herbicides. Mulch contributes to plant health, reducing the need for fertilizers and pesticides.



#### **End-of-Life Management:**

Mulch generated from wood containing lead-based paint or wood preservative should not be used.

- Help others to recycle by not mixing wood containing lead-based paint or wood preservative with organic (e.g., green waste) recyclables.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
  - [Stormwater Runoff](#)
  - [Fertilizers and Pesticides](#)
  - [Water Conservation](#)
  - [Material to Avoid](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Local Agency Procurement](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

## Environmental and Health Issues

### RECYCLED CONTENT

Compared to virgin mulch production, making mulch from recycled content material conserves landfill space.

**What to look for:** Look for mulch that meets or exceeds the minimum content requirements of the [State Agency Buy Recycled Campaign](#).

### STORMWATER RUNOFF

Mulch reduces soil compaction and increases soil porosity. Mulch protects soil by deflecting raindrops and irrigation spray, which reduces erosion. Since mulch allows soil to hold more water, this can help reduce stormwater runoff and protect water quality.

### FERTILIZERS AND PESTICIDES

Mulch gradually adds organic matter to the soil, attracting beneficial organisms that improve soil fertility which reduces the need for fertilizers. Mulch improves soil health, increases disease and pest resistance, and reduces chemical and pesticide usage. Mulch controls weed growth, especially annuals by as much as 90 percent which reduces the need for applying herbicides.

### WATER CONSERVATION

Mulch conserves water by reducing evaporation from the soil surface. In the summer, two inches of mulch can reduce water loss by 20 percent and lowers temperature in the top four inches of the soil by 10 degrees. Young shrubs and trees can grow stronger roots and establish better under mulch than under bare ground. A thicker layer of mulch can reduce irrigation needs by approximately 50 percent. [\[1\]](#)

### MATERIAL TO AVOID

Forests can be rich sources of biodiversity. [\[2\]](#) They are important for fish and wildlife habitat; provide food, shelter, and aesthetic and recreational benefits to humans; help slow global warming by storing and sequestering carbon; and help regulate local and regional rainfall. [\[3\]](#) Avoid mulch made from fiber from old growth forests, endangered forests, and unsustainably harvested forests. These terms may be defined differently by different parties, so to be on the safe side, consider purchasing mulch generated from 100 percent recycled content materials, which does not require logging more trees.

### LAWS AND GUIDELINES

#### California

##### **Statute**

##### **[State Agency Buy Recycled Campaign \(SABRC\)](#)**

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on compost,

cocompost, and mulch products be spent on products that meet the minimum content requirements set forth in [PCC section 12209](#). [PCC section 12209\(c\)](#) states "For recycled compost, cocompost, and mulch, at least 80 percent of the product shall consist of materials, including, but not limited to, the materials listed in subdivision (c) of Section 12207, that would otherwise be normally disposed of in landfills." **Note: See [PCC section 12207\(c\)](#) for detailed definitions of compost, cocompost, and mulch for the SABRC.**

- The SABRC compost, cocompost, and mulch category includes mulch, compost, and cocompost products including soil amendments, erosion controls, soil toppings, ground covers, weed suppressants, and organic materials used for water conservation. **Note: See [PCC section 12207\(c\)](#) for detailed definitions of compost, cocompost, and mulch for the SABRC.**
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires compost, cocompost, and mulch purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

## Federal

- Since 2000, under federal Executive Order 13148, federal agencies have been required, in implementing landscaping policies, to purchase environmentally preferable and recycled content products, including United States Environmental Protection Agency (USEPA)-designated items such as compost and mulch that contribute to environmentally and economically beneficial practices.
- The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the USEPA in the [Comprehensive Procurement Guidelines](#) (CPG). Hydraulic mulch is a USEPA-designated item. [\[4\]](#) Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable. [\[5\]](#) This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [\[6\],\[7\]](#) The USEPA's [recommended recovered materials content levels for hydraulic mulch](#) are available on-line.

Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [\[8\]](#)

## PERFORMANCE

Since many types of materials can be used as mulch, performance is best determined by examining product type and intended use.

- **"Coarse"** grade material. (Particle size up to five inches) is used for temporary road surface, mud control, and for erosion control.
- **"Medium"** grade material. (Particle size up to 3.5 inches) is used for surface material, horticultural mulch, and erosion control.
- **"Fine"** grade material. (Particle size up to two inches) is used for horticultural mulch and soil amendment.



Concerns about physical contaminants in mulch such as plastic, glass, and metal, can be addressed by requiring that the product contains no visible contaminants. Weed seeds and pathogens can be a problem unless the material is maintained, using a windrow composting process, at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a period of 15 days or longer, and there is a minimum of five (5) turnings of the windrow. Mulch produced by an aerated static pile process, in which all active material is covered with six to 12 inches of insulating material, only requires that these temperatures be maintained for a period of three days.

The Minnesota Solid Waste Management Coordinating Board has developed an on-line [Environmentally Preferable Purchasing Guide](#) that includes sections on the following:

- [Landscape Mulch](#)
- [Hydraulic Mulch and Hydroseeding](#)

## AVAILABILITY

Mulch is widely available in large or small quantities from public and private mulch and compost producers, landscape companies, and scrap wood processors. Sources of mulch can be found in the yellow pages under such headings as "Rock" and "Landscaping Equipment and Supplies." Some cities, prisons, public utilities, and colleges also produce and sell mulch to offset program operating costs. See the [Vendor](#) section for a link to a partial list of several mulch and compost suppliers in California.

## COST

Mulch prices vary based upon a number of factors, such as processing required for a given product, transportation distance to application site, and type of feedstock. Mulch purchased in bulk instead of bags is considerably less expensive. Mulch produced from shredded urban wood waste is significantly less expensive than virgin wood mulch or landscape rock.

Although mulch might initially be more expensive to apply compared to commonly-used materials such as herbicides or weed barrier fabric, mulch can offer long-term cost benefits. The use of mulch minimizes the need to dispose organic material in landfills, which reduces transportation and disposal costs. Mulch suppresses weeds, reducing the need for herbicides and costly hand labor. Mulch helps retain soil moisture and rain runoff, reducing irrigation costs. Mulch increases disease and pest resistance, reducing chemical and pesticide usage. Mulch applied for erosion control can reduce costs related to deposition of sediment on roadways and can help agencies avoid fines for illegal discharge of pollutants into waterways.

## Tips on Buying Compost

Buy mulch that meets the requirements of the application type. For example, mulch used to suppress weeds requires different performance characteristics than mulch used in filter socks for erosion control. Remember - it is important to determine the appropriate product for a specific application.

## SPECIFICATIONS

### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If



you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

The California Department of Transportation (Caltrans) develops specifications on roadside application of mulch for their statewide projects. If you have questions regarding developing specifications for roadside applications, contact the [Caltrans Office of Landscape Architecture](#).

## Tips for Writing Specifications

### **Sample Language**

It may be useful to contact several local mulch suppliers in order to develop specifications that meet the end use application. The language can specify feedstock type, particle size, pathogen reduction, maximum contaminant levels, etc. When purchasing mulch, consider including specifications which require recycled content mulch, not virgin materials. Besides environmental and health benefits, specifications can ultimately help lead to better prices by increasing demand for recycled-content mulch. For more information on sample specifications, see the California Integrated Waste Management Board (CIWMB) publication titled "[Guidelines for Writing Compost or Mulch Procurement Specifications](#)".

### **Other Specifications**

- [Minnesota Solid Waste Management Coordinating Board](#)
- [United States Environmental Protection Agency \(USEPA\), Database of Environmental Information for Products and Services](#). This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services.
  - If you have a specification for an environmentally preferable product or service, consider asking the [USEPA](#) to include it in this database.

## VENDORS

- Mulch and compost suppliers can be located by visiting the CIWMB's [Organic Materials Management Facility Search](#) page.
- The CIWMB's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.
- The CIWMB publication titled "A Landscaper's Guide to Mulch: Save Money, Control Weeds, and Create Healthy Landscapes", provides landscapers with a practical guide to mulch use. This publication describes the different types of mulch and their uses, provides guidelines on how to apply mulch for various end uses, how to prevent the spread of plant diseases, tips on how and where to buy mulch, and much more.

## LOCAL AGENCY PROCUREMENT

[Public Contract Code 10298](#) allows local agencies to participate in State procurement, including agreements for goods and services. The Department of General Services (DGS) [Master Agreements](#) Web page contains information on such programs as the Master Agreements and Statewide Contracts and California Multiple Awards Schedules. These programs specifically offer a vast array of goods and services that a particular local agency may not have the expertise in procuring.

## SUCCESS STORIES

### **[A Case Study: Mulch](#)**

This case study provides an example in Alameda County (California) of a local landscaper's success with chipping and reusing plant debris as mulch on the landscapes they maintain.

### **Mulch Demonstration Project, Napa and Sonoma Counties: Utilization of Composted Mulch for Erosion Control in Hillside Vineyards**

Data from this partnership demonstration project substantiate the effectiveness of using composted mulch in the vine row only to control soil erosion in four California vineyard plots. The report includes data tables, graphs, and a glossary as well as a plot layout, plot schematic, and mulch manufacturing information.

### **Mulch Demonstration Project, Napa County: The Effects of Green Material Mulches on Erosion and Dissolved Organic Nutrient Loss from Recently Disturbed Hillside Vineyard Soils**

Data from this partnership demonstration project compare the effectiveness of using composted mulch generally broadcast in three California vineyard plots vs. the traditional straw treatment to control soil erosion. The report includes data tables, graphs, and charts as well as cost-benefit analyses, specifications for mulch production, and application guidelines.

## **RESOURCES AND WEBSITES**

### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the CIWMB's Organic Materials Management -- Compost and Mulch Web pages.

### **King County Environmental Purchasing Program**

Seattle, WA  
(206) 296-0100  
(800) 325-6165

A pioneer and contemporary model in environmental procurement, King County provides sample contract specifications for compost and landscape mulch, and information on a variety of other products. In addition, its Web site contains procurement case studies along with resources for environmental purchasing and waste reduction.

### **Mulch and Soil Council**

Manassas, VA  
(703) 257-0111

The mission of the Mission and Soil Council is to define quality products and promote an open marketplace for producers of horticultural mulches, consumer soils and commercial growing media.

### **The Office of the Federal Environmental Executive (OFEE)**

Washington, DC  
(202) 564-1297

As part of its broader mission to promote sustainable environmental stewardship throughout the federal government, the OFEE promotes the acquisition of recycled-content, environmentally preferable, and biobased products.

### **United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products such as compost. Visit the USEPA's [Comprehensive Procurement Guidelines](#) (CPG) Web site for Recovered Materials Advisory Notices (RMANs), which

recommend recycled-content levels. The site includes information on landscaping products, such as hydraulic mulch, and a fact sheet on [procurement guidelines for landscaping products](#).

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- [1] California Integrated Waste Management Board. A Landscaper's Guide to Mulch: Save Money, Control Weeds, and Create Healthy Landscapes.  
 [2] United States Environmental Protection Agency. Technical Document: EPA's Draft Report on the Environment 2003, p. 5-9. Available at [http://www.epa.gov/Envindicators/roe/pdf/EPA\\_Draft\\_ROE.pdf](http://www.epa.gov/Envindicators/roe/pdf/EPA_Draft_ROE.pdf).  
 [3] Union of Concerned Scientists. Invasive Species - Forests Web page. Available at [www.ucsusa.org/invasive\\_species/forests-index.html](http://www.ucsusa.org/invasive_species/forests-index.html). Accessed on January 12, 2006.  
 [4] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines EPA Expands Comprehensive Procurement Guideline (CPG) fact sheet.  
 [5] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Landscaping Products fact sheet.  
 [6] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.  
 [7] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Landscaping Products fact sheet  
 [8] Ibid.

## GM – Plastic Temporary Fencing

### Environmental and Health Issues and Recommendations



#### Recycled Content:

Postconsumer plastic comes from plastic that has been used by consumers and then collected through recycling programs. Most recycled-content plastic temporary fencing contains between 60 to 100 percent recycled plastic. Plastics account for 8 percent of landfill waste by weight, but 20 percent by volume. [1] Therefore, using recycled-content plastic temporary fencing keeps waste plastic out of landfills by creating a market for the plastic collected.

- Purchase plastic temporary fencing with at least 10 percent by weight postconsumer plastic. Higher postconsumer plastic content is recommended.

See the [Introduction](#) for a complete description of this environmental issue.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

### BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Plastic temporary fencing goes by many names, according to the application - snow fencing, temporary fencing, beach or dune fencing, warning fencing and safety barrier fencing. It is designed for temporary purposes, such as containing snow drifts or keeping people away from construction, sensitive, or dangerous areas. Typically orange (sometimes red or green), this product is in an open-weave pattern also described as a woven plastic mesh or chain link style. Plastic temporary fencing is usually available in 50 to 100 foot rolls that are 4 to 8 feet in height. The most common recovered and postconsumer plastic resin used to make such fencing is high density polyethylene (HDPE).

## **Environmental and Health Issues**

### **RECYCLED-CONTENT**

Recycling is more than just having your recyclables - cans, bottles, and paper - collected and delivered to a recycling facility. This is only the first step in the process. The second step occurs when companies use these recyclables to manufacture new products. The third step comes when you purchase products made from these postconsumer materials. That is how we close the loop. Buying recycled-content plastic products results in many environmental and economic benefits:

- Supports local recycling programs by creating markets for the collected materials that are processed and used to manufacture new products;
- Recycling plastics reduces the amount of natural resources extracted (natural gas and oil in particular). More than 95 percent of the total energy required to produce one kilogram of plastics goes into extraction and refining. Avoiding these steps by recycling can result in energy savings; [\[2\]](#)
- The United States Environmental Protection Agency (USEPA) estimates energy savings from recycling four kinds of plastics ranges from 19 to 24 million British thermal units (BTU) per ton of plastics recycled. This is equivalent to about 150 to 200 gallons of gasoline per ton of plastics recycled. Studies have revealed reductions in air and water emissions when recycled plastics are used in production instead of virgin materials; [\[3\]](#)
- Recycling also creates jobs. Two recent studies on the economic impacts of disposal and recycling in California found that diversion (recycling or reuse) results in an average of 212 percent increase in sales and public outlays as compared to disposal, a 165 percent increase in income, a 177 percent increase in value-added production, and a 190 percent increase in jobs. Diversion creates 4.7 jobs per 1,000 tons, while disposal creates 2.5 jobs per 1,000 tons. [\[4\]](#)

**What to look for:** Look for plastic temporary fencing with high levels -- 60 to 100 percent -- of postconsumer plastic.

### **LAWS AND GUIDELINES**

#### **California**

##### **Statute**

##### **State Agency Buy Recycled Campaign (SABRC)**

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on plastic products be spent on plastic products with at least 10 percent postconsumer recycled content [exception: see content requirements for printer and duplication cartridges in [PCC 12209\(f\)\(2\)](#)].

- The SABRC plastic products (PL) category includes, but is not limited to, printer or duplication cartridges, diskettes, carpet, office products, plastic lumber, buckets, wastebaskets, containers, benches, tables, fencing, clothing, mats, packaging, signs, posts, binders, sheet, building products, garden hose, and trays (see [PCC section 12207](#)).
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires PL purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

## Federal

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the USEPA in the [Comprehensive Procurement Guidelines](#) (CPG). Plastic fencing is a USEPA-designated item. Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable. [\[5\]](#) This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [\[6\],\[7\]](#) The USEPA's recommended recovered materials content levels for [fencing containing recovered plastic](#) are 90-100 percent recovered materials content, including 60-100 percent postconsumer content.

Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [\[8\]](#)

## PERFORMANCE

Research supporting the USEPA's [Comprehensive Procurement Guidelines](#) indicates that users of recycled-content plastic temporary fencing report no performance problems. In addition, the California Department of Transportation (Caltrans) has not experienced any problems with using such fencing either.

## AVAILABILITY

Currently, there are a number of manufacturers and distributors of recycled-content plastic fencing. See the [Vendors](#) section.

## COST

**Note: The following discussion on cost is general and is not meant to reflect specific contracts or to supersede existing mandates or policies.**

According to USEPA research, recycled-content plastic temporary fencing is cost-competitive with fencing featuring no recycled-content plastic. Depending on the source used, there may or may not be shipping

costs to consider when evaluating cost-competitiveness with products lacking recycled-content plastic. [\[9\]](#) Additionally, this product can be reused for multiple seasons and then recycled.

## SPECIFICATIONS

### California

The office of [Office Engineer](#) of the Department of Transportation develops, advertises, and awards legal and cost-effective contracts for the districts. [Office Engineer Specifications](#) for temporary fencing (07-446) can be found under section 10 of the Standard Special Provisions (SSP). This specification indicates the fabric may be made of recycled material.

### Tips for Writing Specifications

- For critical applications, include strength, contraction, UV protection, and performance, in addition to recycled-content requirements. Please refer to New York, New Jersey, and Massachusetts' [specifications](#).
- Sample language to include in specifications:

"Provide plastic temporary fencing with at least 60 percent by weight postconsumer plastic material."

### Other Specifications

- Massachusetts - The Commonwealth of Massachusetts, Operational Services Division developed product specific language that is available in the [USEPA's Database of Environmental Information for Products and Services](#). The specifications require recycled-content fencing, and state that "All plastic used for fencing and post materials must be made from a minimum of 60% postconsumer recycled plastic."
- New Jersey - New Jersey required orange, UV-stabilized fencing with a minimum tensile strength (stretching capability) of 3,190 pounds per square inch (PSI) (horizontal) and 3840 PSI (vertical), as measured by ASTM test D638, and ultimate tensile strength of 220 PSI (horizontal) and 2660 PSI (vertical). [\[10\]](#) This specification recommended recovered content plastic fencing, but did not include specific recycled content amounts (specifications provided 1997).
- New York - New York's specifications required an orange-colored plastic fencing used for snow barriers, warning barriers and safety barriers. Height varied, depending on application, from 4 to 6 feet. Weight varied from 17 pounds per 100-foot section for warning barriers to 48 pounds per 100-foot section for snow fencing to 66 pounds per 100-foot section for 6-foot safety barrier fencing. It also addressed mesh size, porosity, service temperature range, and strength for each application. [\[11\]](#) This specification recommended recycled material, stating that "vendors are encouraged to use secondary or recycled materials in the manufacture of products to the maximum extent practicable" (specifications developed in 1992).

**Please note:** Neither New York or New Jersey's specifications remain in effect, because neither state purchased sufficient quantities of plastic fencing to justify maintaining the specifications. Now, New York obtains this product under its industrial supplies contract (as of 2005).

## VENDORS

Check to see if your distributor carries or can obtain recycled-content plastic temporary fencing. Vendors can be found on the following list servers or databases.

### Comprehensive Procurement Guidelines

The USEPA's list of designated products and the accompanying recycled-content recommendations provide recycled-content product information and two sources of vendors. One source is the [database of](#)



[suppliers](#) that identifies manufacturers and suppliers of plastic fencing containing recycled-content plastic. The second source is the [GSA Advantage](#) that lists products available through the Federal Supply Service.

### **The Environmentally Preferable Purchasing Guide**

The Solid Waste Management Coordinating Board of Minnesota developed this Guide as a reference tool for government and school purchasers who want to buy more wisely. Section 9.4 lists known [North American manufacturers and distributors of recycled-content plastic temporary fencing](#) that meets the federal procurement guidelines.

### **Recycled-Content Product Directory**

The California Integrated Waste Management Board's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

## **SUCCESS STORIES**

### **California**

Caltrans has been using recycled-content plastic temporary fencing to cordon off Environmentally Sensitive Areas (ESA) from contractor activities during construction without any problems.

### **States of New Jersey and New York**

The states of New Jersey and New York, including the New York State Thruway Authority, are among states that have purchased plastic fencing containing recycled-content plastic and reported no performance problems with the products purchased. [\[12\]](#)

## **RESOURCES AND WEBSITES**

### **[California Integrated Waste Management Board \(CIWMB\)](#)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

### **[Department of Conservation, Division of Recycling](#)**

Sacramento, CA  
Toll-Free: 1-800-RECYCLE  
(916) 323-3836

The Department of Conservation provides services and information that promote environmental health, economic vitality, informed land-use decisions and sound management of our state's natural resources.

### **[Solid Waste Management Coordinating Board \(SWMCB\) of Minnesota](#)**

The SWMCB distributes resource materials on a variety of waste issues for residents, businesses, nonprofit organizations and government organizations. In particular, [The Environmentally Preferable Purchasing Guide \(2004\)](#) provides government purchasers with information on purchasing environmentally preferable products. Over thirty types of products are addressed in the Guide. Information about environmental and health issues, cost, availability, performance and specifications for each product is provided.



### United States Environmental Protection Agency (USEPA)

Washington, DC

(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products such as recycled-content plastic fencing. Visit the USEPA's [Comprehensive Procurement Guidelines \(CPG\) Web site](#) for Recovered Materials Advisory Notices (RMAN), which recommend recycled-content levels. The site includes a [plastic fencing page](#), a [CPG Supplier Database](#), and a [Database of Environmental Information for Products and Services](#).

[1] California Resource Recovery Association, October 18, 2005 California America Recycles Day, available at: <http://www.recycleday.org/>

[2] Plastic White Paper: Optimizing Plastics Use, Recycling, and Disposal in California. May 2003. California Integrated Waste Management Board publication. Available at: [www.ciwmb.ca.gov/Plastic/](http://www.ciwmb.ca.gov/Plastic/).

[3] Ibid.

[4] Ibid.

[5] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Park & Recreation Products Fact Sheet.

[6] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.

[7] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Park & Recreation Products Fact Sheet.

[8] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Park & Recreation Products Fact Sheet.

[9] Solid Waste Management Coordinating Board of Minnesota, Environmentally Preferable Purchasing Guide, Plastic Temporary Fencing section available at:

<http://www.rethinkrecycling.com/government/eppg/-buy-products-services/grounds-maintenance/plastic-temporary-fencing>, and the United States Environmental Protection Agency's Comprehensive Procurement Guidelines II Background Document 1997, pp. 73-75, available at: [www.epa.gov/cpg/rman2.htm](http://www.epa.gov/cpg/rman2.htm).

[10] Ibid.

[11] Ibid.

[12] United States Environmental Protection Agency's Comprehensive Procurement Guidelines II Background Document, page 73, available at: [www.epa.gov/cpg/rman2.htm](http://www.epa.gov/cpg/rman2.htm).

## Medical Supplies – Medical Supplies that Contain Mercury

### Environmental and Health Issues and Recommendations



**Less Hazardous:** Purchasing medical devices that do not contain mercury reduces the release of mercury into the environment.

- Choose medical supplies that do not contain mercury.



### End-of-Life Management

Discarded thermometers, sphygmomanometers (blood pressure monitors), esophageal dilators and weighted tubing that contain mercury are regulated as hazardous waste under the Department of Toxic Substances Control's (DTSC) Universal Waste program.

- Reduce end-of-life management costs by purchasing medical supplies that do not contain mercury.

See the [Introduction](#) for complete descriptions of these environmental and health issues

- [Background and Environmental and Health Issues](#)
  - [Incineration](#)
  - [Landfill](#)
  - [Water Releases](#)
  - [Human Health Implications](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)
- [End-of-Life Management](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES [\[1\]](#)

Mercury can be found in many common health care devices, from fever thermometers, blood pressure cuffs, and esophageal dilators, to mercury-containing motion switches, fluorescent light bulbs, and cleaning solutions. Mercury is also found in laboratory chemicals and measurement devices. When mercury-containing devices are improperly disposed of (in red bags or down the drain, for example), they can cause significant human health and environmental problems. [\[2\]](#)

Hospitals are a significant source of mercury arriving at publicly owned treatment works (POTW), contributing 5 -10 percent of the total mercury in wastewater, according to a recent study by the Association of Metropolitan Sewerage Agencies. Mercury enters hospital wastewater from disposal of laboratory chemicals, dental services, and cleanup of broken mercury-containing devices such as thermometers and blood pressure cuffs. [\[3\]](#)

### Environmental and Health Issues

#### INCINERATION

When mercury-containing waste is incinerated, the mercury is vaporized into the air. According to the United States Environmental Protection Agency (USEPA), medical waste incinerators are the fourth largest source of mercury to the environment. [\[4\]](#) Additionally, medical and municipal waste incinerators are responsible for 30 percent of the total mercury emissions to air. [\[5\]](#)

#### LANDFILL

When mercury-containing devices are disposed in the landfill, mercury can reenter the environment through gases released by landfills and through leaching into the ground water. USEPA estimates that for the year 2000, mercury fever thermometers contributed to 17 tons of mercury in U.S. municipal solid waste. [\[6\]](#) The estimated quantity of mercury is expected to decline due to passage of [legislation SB 633](#).

#### WATER RELEASES

When mercury-containing waste (including fixatives, medicine, cleaning solutions) are dumped down the drain, the mercury eventually returns to the water supply, and is converted to methylmercury by bacteria. Methylmercury bioaccumulates in aquatic animals, and the concentrations can increase by a million fold in animals at the top of the food chain. [\[7\]](#)

## HUMAN HEALTH IMPLICATIONS

The primary pathway for mercury to impact human health is through eating mercury-contaminated fish. California and 41 other states post fish consumption advisories because of widespread mercury contamination. As a reproductive toxin and a potent neurotoxin, mercury affects the brain and the central nervous system. Pregnant women, women of childbearing age, and small children are at greatest risk. Mercury can cross the placenta and cause irreparable neurological damage to the fetus. A National Academy of Sciences report from July 2000 showed that 60,000 babies born in the United States each year are at risk of neurological damage due to their mothers eating mercury-contaminated fish. [\[8\]](#)

**What to look for:** Look for medical supplies that do not contain mercury.

## LAWS AND GUIDELINES

### California

#### *Statute*

The [California Mercury Reduction Act of 2001](#) (SB 633, Sher, Chapter 656, Statutes of 2001) prohibits any person, except as specified, on and after July 1, 2002, from selling at retail or supplying a mercury fever thermometer, as defined, to a consumer or patient in the state, except by a prescription.

### Federal

Under [certain Federal environmental statutes](#), such as the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act, the USEPA has the responsibility to develop regulations to control some mercury emissions to air, water, or from wastes and products.

On June 24, 1998, the American Hospital Association (AHA) and the USEPA signed a landmark agreement identifying goals to reduce the impact of health care facilities on the environment.

### Other States

More than a dozen states have passed comprehensive legislation aimed at reducing the amounts of mercury in their states. Health Care Without Harm-an international health care coalition-promotes the passing of ordinances and resolutions banning the manufacture, sale, and distribution of mercury-containing devices. Such legislation supports mercury elimination practices already in place all over the country, from local mercury fever thermometer exchanges to major health care institutions' efforts to replace their mercury-containing devices with effective and safer alternatives.

## PERFORMANCE

Two independent studies have found significant accuracy problems associated with mercury thermometers, with 53 percent of new mercury thermometers inaccurate by at least  $\pm 0.1$  degree C. [\[9\]](#)

The American Society for Testing and Materials (ASTM) standard for glass/mercury medical thermometers specifies a maximum allowable error of  $\pm 0.1$  C in the cited range. [10]

A study of 444 mercury sphygmomanometers (blood pressure monitors) found accuracy problems, with 55 percent showing zero level between 10 and 20 mm Hg (mercury), and 38 percent had dirty columns that obscured readings. [11]

Peer-reviewed studies show that electronic and aneroid sphygmomanometers (non-mercury) are accurate within acceptable clinical practice limits if calibrated regularly according to manufacturer directions. [12] Mercury-free blood pressure measuring devices have been used by most major medical facilities and accepted by medical personnel for many years.

## AVAILABILITY

Mercury-free medical supplies are available from a variety of manufacturers. A list of resources is provided on page eight in "[Eliminating Mercury in Hospitals.](#)" [USEPA Environmental Best Practices for Health Care Facilities](#), November 2002.

The [Sustainable Hospitals Program](#) (SHP) provides technical support and lists of alternative products to the health care industry for selecting products and work practices that eliminate or reduce occupational and environmental hazards, maintain quality patient care and contain costs. They support and collaborate with health care institutions, clinicians, unions representing health care practitioners, students, and government, as well as environmental and health care advocacy groups.

## COST

**Note: The following discussion on cost is general and is not meant to reflect specific contracts or to supersede existing mandates or policies.**

Although individual mercury-free products may cost more than conventional products, the overall costs associated with mercury products are much higher. A "mercury management policy" and spill response plan must be developed for facilities that use mercury-containing devices. Employees who clean up mercury spills must receive annual training and the proper equipment. Health care facilities using mercury-containing products must face these additional costs. When spills do occur, not only is there the risk of occupational exposure, but also cleanup costs often amount to thousands of dollars. Mercury disposal is expensive and few disposal options are truly risk free. Mercury-contaminated waste that is handled by a hazardous waste hauler can end up in a hazardous waste incinerator, resulting in mercury emissions to the environment. [13]

Health care facilities can avoid the mercury risk altogether by using non-mercury alternatives. Safe, effective alternatives exist for nearly all traditional health care uses of mercury, from temperature and blood pressure measurement to fixatives used in the lab.

Because of health and safety considerations and the environmental impact of mercury, any hospital that stores and uses mercury-containing devices within its facility is required by federal regulations to be prepared to handle mercury spills. [14]

## SPECIFICATIONS

### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, [contact the team](#).

## **Tips for Writing Specifications**

### ***Sample Language***

[INFORM, Inc.](#) is an independent nonprofit research organization that examines the effects of business practices on the environment and on human health. Its goal is to identify ways of doing business that ensure environmentally sustainable economic growth. INFORM's reports are used by government, industry, and environmental leaders around the world.

#### Recommended specification from INFORM:

"As part of [state's] efforts to reduce the use and disposal of mercury and mercury containing products, the [state] has determined that any contracts resulting from this solicitation must meet the following requirements:

- In their response, Bidders must offer mercury-free alternatives to all products which contain intentionally added mercury (mercury added products) where such alternatives exist.
- Should such alternatives not be available, bidders must submit with their response a list of products without mercury-free alternatives and an explanation of why alternatives are not available.
- Following a contract award, contractors must not sell any mercury added products, even if they have received a direct request from a contract user, unless they have submitted a written request and received written prior approval from the [procurement office].

"Additionally, it is desirable that Bidders offer:

- A proposal for a collection system to ensure recycling or proper disposal of mercury for any product containing mercury offered for sale on this contract when no mercury-free alternative is available. This includes any mercury containing batteries (such as button batteries) that may be sold with equipment such as electronic thermometers.
- A proposal on the type of mercury reduction and/or elimination training for contract users that would be offered by the bidder.
- A description of any other efforts that the bidder would undertake as part of this contract to reduce/eliminate the sale and use of mercury containing products, as well as any mercury reduction efforts being undertaken or proposed by the bidder which are not related to this contract.
- Identification of products which contain mercury (when no mercury-free alternatives are available) to contract users at the time of purchase and delivery. This language can also be adapted if other mercury-containing components are required.

"The [purchasing office] reserves the right to remove products from this contract that have been deemed hazardous and/or unacceptable by federal/state/agency regulations and/or guidelines for their agencies or affiliate departments."

### ***Other Specifications***

#### Massachusetts Request for Response (RFR) HSP16 for Medical and Surgical Supplies (mercury section on page 12).

Massachusetts restricts the sale of mercury-containing products, allowing vendors to sell them only when no mercury-free substitute is available. Since spring 2001, no vendor has sold any mercury-containing product to the state. Note that in these specifications, "mercury-labeled" means "mercury-added."

**[United States Environmental Protection Agency Database of Environmental Information for Products and Services](#) (Search "healthcare products")**

This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services.

**[Wisconsin Statewide Contract for Medical/Surgical and Related Products](#) (Contract Number: 15-47598-201)**

Wisconsin restricts the sale of mercury-containing thermometers and blood pressure equipment, and reserves the right to remove other mercury-containing items from the contract.

## **VENDORS**

Also see [lists of alternative products](#).

### **California State Contracts**

The California Strategic Sourcing Initiative (CSSI) allows the State of California to purchase the best products and best services for the best value. Some CSSI contracts pertain to medical supplies. Go to CSSI's News and Events Web page and select the "Contract Key Dates" link. This link connects to the latest information about tentative award dates for upcoming contracts. Please note that these contract award dates are subject to change.

The use of these contracts are mandatory for all State departments except when they purchase from a California-certified Small Business Enterprise or a California-certified Disabled Veteran Business Enterprise, in cases of emergency, or as identified in the contract.

### **The California Multiple Award Schedules (CMAS)**

The [California Multiple Award Schedules](#) (CMAS) contracts are established using products, services and prices from already existing competitively assessed and cost compared multiple award contracts. The products, services, and prices are primarily from the federal [General Services Administration](#) (GSA) multiple award schedule program, but not exclusively. To these products, services, and prices, the Department of General Services (DGS) adds California contract terms and conditions and procurement codes and policies and establishes a totally independent California contract.

The contracts are utilized statewide by both California state and local government agencies under delegated authority from the DGS. Agencies make best value purchasing decisions according to their own business needs such as price, warranty, and supplier performance.

To search for vendors of medical supplies, visit the [CMAS Basic Search Web page](#); click on "View Products/Services;" select the appropriate product description from the Product/Service Description list; then follow the directions at the top of the Web page to continue with your search.

[Local agencies](#) may use State procurement contracts.

## **SUCCESS STORIES**

### **Mercury Elimination Leadership Program (HELP)**

The [Mercury Elimination Leadership Program](#) (HELP) provides local training, onsite assistance, and state awards recognizing hospitals reaching the national goal of eliminating mercury from hospitals by 2005. As of October 2005, sixty-four acute care California hospitals have reached the goal of virtual mercury elimination and one hundred seventy-six have pledged to reach this goal.

**Hospitals for a Healthy Environment (H2E)**

Each year, [H2E](#) recognizes the efforts and achievements of Partner health care facilities and Champions of H2E with national recognition. The application process is simple, and the benefits of national recognition are many.

**RESOURCES AND WEBSITES****[California Integrated Waste Management Board \(CIWMB\)](#)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

**Health Care Without Harm (HCWH)**

Arlington, VA

(703) 243-0056

Health Care Without Harm is an international coalition of hospitals and health care systems, medical professionals, community groups, health-affected constituencies, labor unions, environmental and environmental health organizations and religious groups.

**Hospitals for a Healthy Environment (H2E)**

Washington, DC

(800) 727-4179

The H2E is a voluntary program designed to help health care facilities enhance work place safety, reduce waste and waste disposal costs, and become better environmental stewards and neighbors.

**[INFORM](#)**

New York, NY

(212) 361-2400

INFORM, Inc. is an independent nonprofit research organization that examines the effects of business practices on the environment and on human health.

**[Mercury Elimination Leadership Program \(HELP\)](#)**

(800) 700-5854 or (916) 322-3670

The HELP program provides local training, onsite assistance, and state awards recognizing hospitals reaching the national goal of eliminating mercury from hospitals by 2005.

HELP is a joint effort of the Department of Toxic Substances Control, the Department of Health Services, the California Healthcare Association, USEPA Region IX, Hospitals for a Healthy Environment (H2E), California Water Environment Association (CWEA), and Publicly Owned Treatment Works (POTW). This joint effort is supporting the national goal set by the American Hospital Association (AHA) and the USEPA to virtually eliminate health care wastes that contain mercury by the year 2005.

**[Minnesota Pollution Control Agency \(MPCA\)](#)**

St. Paul, MN

(651) 296-6300 or (800) 657-3864

Many businesses use products containing mercury, but may not realize it. Learn why mercury is a concern, how to properly manage mercury, and what alternative products exist.

The MPCA Business Assistance program provides the following services: phone assistance and referrals, printed materials, workshops and presentations, financial assistance, facilitation, and recognition and promotion of success stories.



**Office of the Federal Environmental Executive (OFEE)**

Washington, DC

(202) 564-1297

As part of its broader mission to promote sustainable environmental stewardship throughout the federal government, the OFEE promotes the acquisition of recycled-content, environmentally preferable, and biobased products. Visit the OFEE's Web site for "Priority Chemicals - Mercury" for information on mercury. Additionally, the Web site highlights success stories in environmental procurement, recycling, and waste prevention.

**Sustainable Hospitals Program (SHP)**

Lowell, MA

(978) 934-3386

The SHP provides technical support to the health care industry for selecting products and work practices that eliminate or reduce occupational and environmental hazards, maintain quality patient care and contain costs.

**United States Environmental Protection Agency (USEPA)**

Washington, DC (202) 272-0167

Their mercury site provides a broad range of information: actions by the USEPA and others, including international actions; effects on people and the environment; and how to protect you and your family.

**END-OF-LIFE MANAGEMENT**

Discarded thermometers, sphygmomanometers (blood pressure monitors), esophageal dilators and weighted tubing that contain mercury are regulated as hazardous waste under the Department of Toxic Substances Control's (DTSC) Universal Waste program. DTSC's Web site provides information about the [Universal Waste program, mercury waste classification and management](#).

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[1] Portions of this web page were adapted from the *Why Mercury?* web page published by the Hospitals for a Healthy Environment. Retrieved December 13, 2005 from <http://www.h2e-online.org/about/mercury.htm> (offline).

[2] Hospitals for a Healthy Environment. *Why Mercury?* Web page. December 2005. Available at: <http://www.h2e-online.org/about/mercury.htm> (offline).

[3] Letter from E. Lowry of the Department of Toxic Substances Control to Publicly Owned Treatment Works. Subject: Participation in California's Mercury Elimination Leadership Program. November 4, 2002. Available at [the Department of Toxic Substances Control](#).

[4] United State Environmental Protection Agency, Mercury Study Report to Congress, Vol. II: An Inventory of Anthropogenic Mercury Emissions in the United States, December 1997, page ES-4. Available at: [www.epa.gov/ttn/oarpg/t3/reports/volume2.pdf](http://www.epa.gov/ttn/oarpg/t3/reports/volume2.pdf)

[5] Ibid., page ES-4. Available at: [www.epa.gov/ttn/oarpg/t3/reports/volume2.pdf](http://www.epa.gov/ttn/oarpg/t3/reports/volume2.pdf)

[6] United States Environmental Protection Agency, Characterization of Products Containing Mercury in Municipal Solid Waste in the United States, 1970 to 2000. USEPA, EPA530-R-92-013, April 1992. Available at: [www.p2pays.org/ref/03/02026.pdf](http://www.p2pays.org/ref/03/02026.pdf)

[7] Glass et al., 1999; Lores et al., 1998; Miles and Fink, 1998; Monson and Brezonik, 1998; Watras et al., 1998; Mason and Sullivan, 1997. From Water Quality Criterion for the Protection of Human Health: Methylmercury, EPA-823-R-01-001, January 2001, page 6-1  
<http://www.epa.gov/waterscience/criteria/methylmercury/pdf/merc45.pdf>

[8] Committee on Toxicological Effects of Methylmercury, Toxicological Effects of Methylmercury, National Research Council, [National Academy Press](#), Washington, DC; 2000. Available from:

[9] Leick-Rude, M.K. and Bloom, L.F. "A Comparison of Temperature-Taking Methods in Neonates." Neonatal Network. Volume 17, Number 5, 1998, pp. 21-37.

Mayfield, S. R. et al. 1984. "Temperature Measurements in Term and Preterm Neonates." Journal of Pediatrics. Volume 104. Number 2. Pages 271-275 as cited in Leick-Rude, M.K. and Bloom, L.F. 1998.

[10] American Society for Testing and Materials. E667-98 (2003), Specification for Clinical Thermometers, Maximum Self-Registering, Mercury-in-Glass, American Society for Testing and Materials. E1112-00 Standard Specification for Electronic Thermometer for Intermittent Determination of Patient Temperature. Available from: <http://www.astm.org/>

[11] N.D. Markandu, F. Witcher, A. Arnold and C. Carney. "The Mercury Sphygmomanometer Should Be Abandoned Before It Is Proscribed." Journal of Human Hypertension. Volume 14, 2000, pp. 31-36.

[12] N.D. Markandu, F. Witcher, A. Arnold and C. Carney. "The Mercury Sphygmomanometer Should Be Abandoned Before It Is Proscribed." Journal of Human Hypertension. Volume 14, 2000, pp. 31-36.

V.J. Canzanello, P.L. Jensen and G.L. Schwartz, "Are Aneroid Sphygmomanometers Accurate in Hospital and Clinic Settings?" Archives of Internal Medicine, March 12, 2001, pp. 729-731

[13] Hospitals for a Healthy Environment. The Cost of Mercury Management. Why Mercury? Web page. Retrieved December 13, 2005 from <http://www.h2e-online.org/about/mercury.htm> (offline).

[14] United States Environmental Protection Agency. Eliminating Mercury in Hospitals, United States Environmental Protection Agency Environmental Best Practices for Health Care Facilities, November 2002. Available at [United States Environmental Protection Agency](http://www.epa.gov/mercury/bestpractices/hospitals/)

## Office Machines – Computers and Monitors

### Environmental and Health Issues and Recommendations



#### Less Hazardous:

Products and packaging that have minimal or zero levels of hazardous or environmentally sensitive materials can minimize harmful impacts released during manufacturing, product use, and recycling.



#### Material Availability:

Products and packaging with higher levels of postconsumer recycled content or those made from renewable or bio-based materials can reduce overall environmental impacts.



#### Prevents Waste:

Equipment and packaging that are made with less material, are easily repairable and upgradeable, and designed to facilitate reuse and recycling, while improving or maintaining their performance, help prevent waste. In addition, take-back and reuse programs further prevent waste.



#### Conserves Energy:

Computer systems that meet [ENERGY STAR®](http://www.energystar.gov/) requirements can save up to 80 percent of the energy that might otherwise be wasted when the machines are on, but not in use.



#### End-of-Life Management:

Many components of electronic equipment -including metals, plastic, and glass - can be reused or recycled, while others may present environmental hazards if not managed correctly. In California,

recycling and keeping electronic waste out of landfills is required by [law](#). The Department of General Services has a [Master Services Agreement](#) (MSA) that is designed to provide universal waste recycling services. You can find local recyclers at [eRecycle.org](http://eRecycle.org).



### **Responsible Manufacturers:**

Consider a company's corporate environmental policy and how actively it is being implemented. Reducing environmental impacts during manufacturing is also important.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
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- [End-of-Life Management](#)

See also the [Copier Paper](#) and Laser Printers sections.

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

In California, State agencies purchase on an annual basis more than \$90 million worth of personal computer (PC) goods, which includes \$35 million in desktops and workstations, \$16 million in notebooks, and \$5 million in monitors. By practicing Environmentally Preferable Purchasing (EPP), the State could realize great savings by purchasing products with improved environmental performance.

The nationally recognized [Electronic Product Environmental Assessment Tool](#) (EPEAT) rating system, established in 2005, has environmentally preferable criteria for desktop computers, integrated desktop computers, monitors, notebooks and workstations. EPEAT has been [adopted](#) for use by state agencies in California. The EPEAT rating system includes 23 required and 28 optional [performance criteria](#) in eight categories of product performance. To qualify as an EPEAT bronze level product, a product must meet all 23 required criteria. Silver level products meet all required criteria and at least 14 additional criteria, while Gold products meet all required criteria and at least 21 additional criteria. Below is a brief summary.

### **Reduction/Elimination of Environmentally Sensitive Materials**

Computer equipment contains materials that can pose a threat to the environment if not managed carefully at the end of their useful life. Raw material substitution or elimination is the replacement of existing raw materials with other materials that produce less waste, or a non-toxic waste.

[EPEAT](#) addresses environmentally sensitive materials through mandatory compliance with the European Restriction of Use of Certain Hazardous Substances (RoHS), and additional criteria addressing hexavalent chromium, cadmium, lead, mercury, flame retardants and plasticizers, batteries, and polyvinyl chloride (PVC) and chlorinated plastics.

### **Materials Selection**

When manufacturers create products with postconsumer recycled content it keeps materials collected in residential and commercial recycling programs in productive use. Another consideration is bio-based or renewable plant materials as substitutes for materials derived from fossil fuels. Using less material in a product is called dematerialization or source reduction; it is another method for saving resources.

[EPEAT](#) requires manufacturers to declare whether a product contains postconsumer recycled plastic and renewable/biobased plastic material greater than 5.0 percent by weight, measured as a percentage of total plastic (by weight) in the product. Additional points are awarded for exceeding minimum content levels. EPEAT also requires declaration of product weight.

### **Design for End-of-Life**

Many components of computer equipment - including metals, plastic and glass - can be reused or recycled, provided they can be easily separated and their handling needs identified. Many manufacturers are developing recycling programs for their customers. Visit the California Integrated Waste Management Board's (CIWMB) Web site for a [list of participating manufacturers](#). For more options to reuse or recycle electronics, please visit the CIWMB's [Electronic Product Management Directory](#).

[EPEAT](#) addresses end-of-life issues with a set of criteria. Mandatory criteria cover the identification of materials with special handling needs, easy disassembly, no incompatible paints or coatings for plastic parts greater than 100 grams, and marking of plastic components greater than 100 grams. EPEAT requires circuit boards greater than 10 cm<sup>2</sup> (measured on the largest face), batteries, and other components which contain hazardous material to be safely and easily identifiable and removable. EPEAT further requires 65 percent or greater of material and components by weight to be reusable and recyclable within the current infrastructure and using demonstrated technologies. Optional criteria exist, too.

### **Product Longevity or Life Cycle Extension**

Computer equipment can last longer through a variety of simple methods. Warranties, service agreements, and upgrades can delay the replacement of a whole unit.

[EPEAT](#) requires products to be upgradeable with commonly available tools, and the availability of a product warranty or service contract of at least three years, so that certain components can be changed or extended. Additionally, making replacement parts available for at least five years after the end of production is another way of extending product longevity.

### **Energy Conservation**

Computers and monitors can be significant energy consumers in offices. Computers that automatically "sleep" when not in use, save energy. This is a common feature on most modern computer systems. Further savings occur when there is a second stage of sleep that uses even less energy. Equipment can be turned off for maximum energy savings. Additionally, there is a program called "[80 Plus](#)" that seeks energy savings beyond ENERGY STAR® by looking at efficiencies when the computer is in active mode.

[EPEAT](#) requires ENERGY STAR® certification and all power features must be activated before shipping with initial preset default times. Optional points are awarded for qualification to any new tier or new version of ENERGY STAR®.

### **End-of-Life Management**

When manufacturers take back their products, it helps ensure that future products are designed to facilitate end-of-life management.

[EPEAT](#) requires that manufacturers must provide a take-back or recycling service that meets the United States Environmental Protection Agency's (USEPA) "Plug-In to eCycling: Guidelines for Materials Management."

In California, find your local electronic equipment recycler at [eRecycle.org](http://eRecycle.org).  
See [Laws and Guidelines](#).

### Corporate Performance

Having an environmental policy and an Environmental Management System [\[1\]](#) is a crucial step in reducing and/or preventing environmental impacts. An environmental policy consistent with ISO 14001 standards will help companies make the right procurement choices for their business while being environmentally friendly. In following the "plan, do, check, and act" theme of ISO 14001, performance tracking and auditing are required to assess the implementation of those standards.

[EPEAT](#) requires a corporate environmental policy consistent with ISO 14001 and a self-certifying environmental management system for manufacturing facilities and corporate environmental reporting in the company's annual report.

### Packaging

Similar to products, packaging that is source reduced, reused or made from postconsumer recycled and recyclable materials; and without toxic substances, can provide environmental benefits.

[EPEAT](#) requires that non-reusable packaging is separable (corrugated can be separated from foam) to facilitate sorting and recycling; EPEAT requires reduction/elimination of intentionally added toxics such as heavy metals and a declaration of recycled content. Options for additional points are given for meeting certain minimum levels of postconsumer content, take back and reuse, in addition to 90 percent of the packaging being recyclable and having plastic components labeled.

## LAWS AND GUIDELINES

### California

#### Statute

- **Limits on Some Polybrominated Biphenyls (PBB) or Diphenyl Ethers (PBDE).** In California on and after June 1, 2006, a person may not manufacture, process, or distribute in commerce a product, or a flame-retarded part of a product, containing more than one-tenth of one percent of pentaBDE or octaBDE, except for products containing small quantities of PBDEs that are produced or used for scientific research on the health or environmental effects of PBDEs. (*California Health and Safety Code, Sections 108920-108923 as amended by [AB 2587, Chan, Chapter 641, Statutes of 2004](#)*)
- **[Electronic Waste Recycling Act of 2003](#)** (Senate Bill 20 and Senate Bill 50). Key elements of the Electronic Waste Recycling Act include:
  1. Reduction in hazardous substances used in certain electronic products sold in California.
  2. Collection of an [electronic waste recycling fee](#) at the point of sale of certain products.
  3. Distribution of [recovery and recycling payments](#) to [qualified entities](#) covering the cost of electronic waste collection and recycling.
  4. Directive to recommend environmentally preferred purchasing criteria for state agency purchases of certain electronic equipment.

See also [End-of-Life Management](#).

- **State Agency Waste Diversion**  
California law [Chapter 764, Statutes of 1999 (Strom-Martin, AB 75)] requires each State agency and large State facility to divert 50 percent of their solid waste stream from landfills or transformation facilities through source reduction, recycling, and composting activities. State agencies can receive source reduction credit for double-sided copying. This should affect the purchase of peripherals by encouraging state agencies to purchase copiers and printers that have automatic duplex capability, and to set up their computers to default to double-sided printing.

### **Regulations**

See End-of-Life Management.

### **Policy**

- **EPEAT adopted.** In response to the Electronic Waste Recycling Act of 2003 (Senate Bill 20 and Senate Bill 50), in June 2005, the CIWMB evaluated, then adopted, the Electronic Product Environmental Assessment Tool (EPEAT) rating system as environmental purchasing criteria to be used by state agencies to identify electronic devices with reduced environmental impacts.
- **Purchase ENERGY STAR® Products.** State of California Purchasing Authority Manual. Chapter 3, Topic 9 requires the purchase of products that meet the Federal Energy Management Program (FEMP) recommended standards, where available, and all products displaying the ENERGY STAR® label meet the FEMP standards.
- **Sustainable Copy Paper Policy (affects purchase of peripherals).** Department of General Services (DGS), Administrative Order 06-04 requires that new copiers and printers purchased have automatic duplex capability and that computers are set up to default to two-sided printing.

### **Federal**

#### **Regulation**

The Federal Acquisition Regulation has many clauses applicable to electronic purchases, including computer-related equipment.

#### **Policy**

Several Federal Executive Orders impact acquisition of computer-related products. In particular:

- Federal Executive Order 13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*.
- Federal Executive Order 13123, *Greening the Government Through Efficient Energy Management*. It requires federal agencies to select ENERGY STAR® compliant products, including computer equipment. State and local governments are encouraged to follow this direction for their computer equipment purchases.
- Federal Executive Order 13221, *Energy Efficient Standby Power Devices*. It requires purchase of products that use no more than one watt in their standby power consuming mode, and if such products are not available, then agencies must purchase products with the lowest standby power wattage.
- The Federal Electronics Challenge (FEC) has an overview of the Federal Legislation and Executive Orders Relevant to the Federal Electronics Challenge, which covers many additional laws and executive orders.

#### **Guidelines**

The FEC also has drafted guidelines for computers, covering the acquisition process, specifications, and certification of environmental qualities.



## PERFORMANCE

According to ENERGY STAR® guidelines, monitors equipped with a sleep feature can save 60 to 80 percent of the energy that would otherwise be wasted, depending on use. The only difference in performance of computers and monitors with sleep features is the few seconds it takes to "wake up" the machine from sleep mode. This is a small compromise for the benefits of saving energy and significantly extending the life of the machines, especially monitors' screens.

## AVAILABILITY

- **EPEAT.** The Green Electronics Council maintains a list of [EPEAT certified products](#).
- **ENERGY STAR®.** Hundreds of computers, monitors, and terminals have been certified as ENERGY STAR® compliant. Visit the ENERGY STAR® web site to view a complete, up-to-date [list of qualifying models](#).
- **Take-Back.** A growing number of computer manufacturers and distributors are responding to the environmental and financial interests of their customers by offering to take back their equipment at the end of its service life.

## COST

### ENERGY STAR®. (EPEAT certified products are ENERGY STAR® compliant)

ENERGY STAR® compliant computer equipment saves money by cutting energy costs. ENERGY STAR® compliant computer equipment typically costs no more to buy than comparable models without power-management features. The sleep feature also reduces stress and wear on the equipment, extending its life well beyond that of equipment without power management features.

To estimate potential energy cost savings for your workplace's computers, copiers, printers and other equipment, visit the [ENERGY STAR®](#) Web site to use the ENERGY STAR® Cost Calculator Tools (on product pages). These on-line tools calculate lifetime energy cost savings for specific products at various efficiency levels and hours of operation.

### Take-Back

Take-back clauses may or may not save money overall. A vendor may seek to charge an up-front fee or incorporate the cost of disposal or recycling in the purchase cost of the equipment. Alternatively, there may be no difference in price, or even a credit if there is remaining market value in the item. This will vary case by case. However, consider the cost your organization will face for proper disposal and recycling - and the cost of staff time to arrange for it - if your contract does not include a take-back requirement.

## SPECIFICATIONS

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#)

### [EPEAT](#) Certification

EPEAT [criteria](#) were established in 2005 by a broad group of industry, environmental, and other stakeholders. The criteria cover desktop computers, integrated desktop computers, monitors, notebooks



and workstations, and cover certain performance criteria. For more information on EPEAT, see the [Background and Environmental and Health Issues](#) section.

EPEAT may be incorporated into specifications, either by incorporating the specific criteria, or by requiring the purchase of EPEAT certified products (once the EPEAT process has certified multiple products). See the EPEAT web site for [sample language](#).

The USEPA [Database of Environmental Information for Products and Services](#) provides examples of language used in bid documents and contracts.

Below are some additional considerations:

### **General Environmental Language**

Consider including an explanation of EPP and expectations. Here is sample language:

#### **Environmental Criteria**

It is the desire of the State to allow eligible authorized purchasers to procure products and services, which help to minimize the environmental impact resulting from the use and disposal of these products. Such products, referred to as "Environmentally Preferable Products" (EPPs), include, but are not limited to, those which contain recycled content, conserve energy or water, minimize waste or reduce the amount of toxic material used and disposed of. Bidder(s) responding to environmental criteria in this eRFP are encouraged to provide information on other environmental initiatives, which may be relevant to California's environmental objectives.

Computers and other electronics are a growing focus of environmentally preferable purchasing activities due to their high prominence in the waste stream, their numerous hazardous chemical constituents, and their significant energy use. The billions of dollars required to properly dispose of this electronic waste will almost entirely come from State and local agencies' budgets. Moreover, when these products are improperly disposed of they can release heavy metals and other hazardous substances that contaminate groundwater and pollute the air.

The primary environmental objective of this eRFP is to procure equipment, which uses less energy over time, thus decreasing pollution and energy costs and represents a reduced negative effect on human health and the environment.

The State has determined that there are a number of potential environmental and public health impacts related to the manufacture, assembly, use, and disposal of computer equipment (hereinafter referred to as computers). In keeping with the environmental and public health goals of California the State is interested in promoting bidder(s) and products, which either have or will address some or all of these concerns.

Points will be awarded to bidder(s) for meeting any or all of the environmental and health criteria listed below. (followed by a list of criteria) [\[2\]](#)

### **ENERGY STAR®**

Meeting ENERGY STAR® performance criteria is required as part of the EPEAT certification. The ENERGY STAR® program has published the ENERGY STAR® Purchasing Tool Kit offering sample procurement language for ENERGY STAR® compliant computers and monitors, specifications for ENERGY STAR® compliant equipment, success stories, savings calculators and other informative resources. There are also lists of compliant products. The Tool Kit is available [online](#) or by calling ENERGY STAR® toll-free at (888) STAR-YES (888-782-7937).

Here is sample language for requiring ENERGY STAR® in bid documents:

It is mandatory that bidder(s) offer goods that meet the most recent set of U.S. Environmental Protection Agency's and Department of Energy's ENERGY STAR guidelines and have the ENERGY STAR label or substitute affixed to any goods covered by such guidelines (<http://www.energystar.gov/>).

Installation, service and any other technical support performed under any Contract resulting from this eRFP must include the proper configuration of power management features according to the current ENERGY STAR specifications for that class of equipment at the time of installation, service or any other technical support.

Personnel providing services must:

- Ensure that power management features on all equipment remain installed and functional at all times;
- Carry out their services so as to maximize the energy efficiency of the installed product;
- Treat the malfunction of power management as functional failures of the equipment, and must diagnose and repair those problems rather than disable the power management features.

All ENERGY STAR power management features must be fully activated upon delivery. In addition, successful bidder(s) must provide the following detailed set-up specifications to authorized purchasers:

- Equipment shall be configured so it automatically enters a low-power mode after a period of inactivity;
- When a computer in a low-power mode is used again, it automatically returns to active mode;
- For computers that will be used in networked environments, provide CPU's and monitors that are set up to sleep on networks and respond to wake events;
- Provide integrated computer systems, where the CPU and monitor will together enter a low power mode of no more than 45 watts after a specified period of inactivity (except PC Servers);
- Provide training, assistance materials (if requested) and customer support on the power management features so that these features remain properly activated. [3]

**Check activation of sleep function.** It is important to check that the sleep function is fully activated. Vendors may not always deliver ENERGY STAR® compliant equipment with the sleep function activated, thus requiring users to set the function themselves. Most system software packages allow the user to set the sleep function for the computer and the monitor, although some widely used Microsoft NT operating system products do not. For example, those using NT 4.0 Workstation, previous to ServicePack 5, need to activate the computer's sleep functions directly in the computer hardware's BIOS (Basic Input/Output System). The monitor's sleep functions will work if they are set on-screen with the monitor's own controls. If, however, they rely on the computer's BIOS, the sleep settings will have to be enabled in the BIOS before starting NT or Windows (or whichever operating system is installed). Other computers will merely require a change to be made via the operating system. Ask your office technical support staff if you need help making these adjustments.

Also ensure that screen savers will not prevent the machine from going into sleep mode. Although screen savers can extend the life of monitors, most do not save energy because of this conflict.

**Take-back or Trade-in:** In both leasing agreements and purchase contracts, use take-back and trade-in clauses. These clauses should specify that any units - or components resulting from unit disassembly - are to be processed to recover and recycle the heavy metals if the unit or components are determined to have no market value or are obsolete. This is particularly important with cathode ray tube (CRT) monitors, which contain a significant amount of lead.

There could also be a clause specifying that any batteries containing heavy metals, such as lead, cadmium, lithium, or silver, are properly removed and either recycled or managed as a hazardous waste before the unit is disposed. Consider specifying that the vendor make every attempt to ensure recycling of the plastic, metal, and glass resulting from processing obsolete machines.

Contracts should require a certification of final disposition that documents what happens to the units, particularly the lead from the monitor's CRT and batteries. This is especially wise if your organization owned the equipment.

Here is text from a [2004 Minnesota Request for Proposal](#) (RFP):

Responders must describe their Equipment Take Back/recycling program by addressing each of the following: date the program is or will be in operation, type of equipment, LAN hardware and/or Peripherals being taken back or proposed to be taken back, volume of Equipment being recycled/disposed or proposed, charges by type of Equipment, compliance with the European Union's WEEE Directive requiring the recycle or reuse of old Equipment and compliance with federal or other regulatory authorities regarding disposal of electronic equipment. Responders should Address ISO 14001 certification.

Here is text from a 2005 State of California RFP:

Bidder(s) should propose a program in which they agree to provide take back and management services for end of life electronic products. This can be accomplished through a contractual provision whereby the seller agrees to be responsible for taking back the products and providing for appropriate re-use or recycling when the authorized purchaser no longer needs the product.

It is **desirable** that bidder(s) also provide take back programs that comply with the following:

- Hazardous electronic waste will not be sent to landfills for disposal;
- Hazardous electronic waste will not be exported to developing countries;
- Recycling will be handled by a responsible recycling operation with an environmental management system in place;
- Any batteries containing heavy metals, such as lead, cadmium, lithium, or silver, are properly removed and either recycled or managed as a hazardous waste before the unit is disposed;
- It is also desirable that bidder(s) propose methods that will allow for the return of used equipment to the original manufacturer or third party entity for reuse or recycling, preferably at **no cost** to authorized purchaser. Any unreasonable costs for this service will result in no points for this section, even if take back methods are submitted. Such take-back methods may include but are not limited to:
- One-for-one exchange of equipment offered by, or previously purchased from the Bidder(s), upon purchase of new equipment from said bidder(s)
- Collection of any used computer equipment by Contractor(s) or sub-Contractor(s) for reuse or recycling, preferably including provisions to continue recycling operations should a sub-Contractor(s) no longer be able to perform such activities
- Coupon system for pre-paid take-back at permanent collection centers, such as, but not limited to, Goodwill Industries, Salvation Army, and Universities.
- If take back provisions are proposed, authorized purchasers must follow applicable laws, procedures and guidelines relating to disposing of equipment prior to invoking disposal procedures. [\[4\]](#)

**Certification:** The State of Minnesota includes [text](#) for specifically identifying the equipment that has been certified by an eco labeling program:

Responders must specifically identify each equipment or peripheral model number that has been certified and the type of certification obtained. In addition, Responders must list the model numbers of units being submitted for certification as well as a schedule for any remaining units. Finally, Responders must describe how certified units are labeled and identified as such on the web site. [\[5\]](#)

**Reporting:** It is important that the RFP requires that the contractor provide information about the environmentally preferable products purchased to know if goals are reached or to help identify problems. Here is sample language:

Contractor(s) must report on compliance with the environmental specifications as well as information on the proper EPP products purchased under the Contract Agreement. Such reports showing all EPP

products purchased will be submitted semi-annually, by the last day of January and by the last day of July.

The EPP products usage report shall be broken down by item, and then broken down again by authorized purchaser and authorized purchaser billing code. The State's Contract Administrator or authorized purchaser (with the concurrence of the State's Contract Administrator) may request these reports at any time. [\[6\]](#)

**Catalogs:** Additionally, it is helpful if purchasers know the environmental benefits of products. This can be achieved if product catalogs include information about any recycled content or third party or governmental certifications. Additionally, it may be desirable to remove some products from the catalog. Here is sample language:

- A. The Catalog must identify those items having recycled content and the amount of such content (including a report of both post-consumer and secondary recycle content, where appropriate). Recycled content should be indicated using the recycled codes as outlined in Exhibit X, Recycle Codes.
- B. Energy Star designation and other environmental or health related designations as indicated by the State. Bidders are encouraged to include this information in the text that describes the product.
- C. The State reserves the right to flag or preclude the ordering of selected items from the *California Catalog*. [\[7\]](#)

**Fact sheets.** The Federal Electronic Challenge (FEC) has developed several [resources](#), which provide suggestions for what to include in specifications. The FEC also has sample [contract language](#) to certify environmental products.

## VENDORS

### Statewide Contracts for Computers and Monitors

Statewide contracts for computers and monitors are available on the DGS [Procurement Division's Web site](#). These contracts are mandatory except as provided for in the contract User Instructions. [\[8\]](#) For information on using one of these contracts, see the User Instructions, review the contract, or contact the DGS buyer named in the contract.

[Local agencies](#) may use State procurement contracts.

### California Multiple Award Schedules (CMAS)

Several brands of computers and monitors are available through the [CMAS](#) program. [Local agencies](#) may use CMAS contracts.

### Universal Waste Recycling Services

The DGS has a Master Services Agreement (MSA) that is designed to provide Universal Waste recycling services and recycling kits. This MSA is designed to process electronic waste, cathode ray tubes (CRT), fluorescent light tubes and batteries. To use this MSA, state agencies must first receive approval for discarding their Universal Waste from the DGS's State Property Reuse Program (via the STD 152 form process). Any local government can use this MSA if this MSA is acceptable for their purchasing efforts. For additional information, visit the DGS's Universal Waste Recycling Services Web site.

## RESOURCES AND WEBSITES

**California Integrated Waste Management Board (CIWMB)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

Visit the CIWMB's [Electronic Product Management](#) Web site and the [eRecycle.org](#) site.

**ENERGY STAR®**

Washington, DC

(888) STAR-YES (888-782-7937)

ENERGY STAR® is a partnership program of the United States Environmental Protection Agency, the United States Department of Energy, and the private sector that secures voluntary participation of manufacturers to meet energy conservation standards for products and equipment. This program provides the "ENERGY STAR® Purchasing Tool Kit: A Guide to Buying Energy Efficient Products," "ENERGY STAR® Cost Calculator Tools," and listings of [ENERGY STAR® compliant products](#).

**EPEAT (Electronic Product Environmental Assessment Tool)**

The Electronic Product Environmental Assessment Tool (EPEAT) rating system, established in 2005, is nationally recognized environmentally preferable criteria for desktop computers, laptops, and monitors.

**United States Department of Energy****Federal Energy Management Program (FEMP)**

Washington, DC

(800) 363-3732

The FEMP was designed to reduce the cost and environmental impact of federal agencies by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at federal sites. FEMP provides a variety of resources to help purchasers more readily identify energy compliant (ENERGY STAR®) products and find ways to save money, energy and natural resources in the office. Consult the following FEMP resources online:

- [Energy-Efficient Products](#)
- [Energy Cost Calculators](#)
- [Greening Federal Facilities](#)

**END-OF-LIFE MANAGEMENT**

"Many types of electronic products used in the workplace and homes contain hazardous substances like lead and mercury. When these products reach the end of their useful lives or become obsolete, some are considered hazardous waste. In general, hazardous waste may not be discarded in the regular trash. Instead, it must be sent to a facility that has a permit for treatment (including recycling), storage, or disposal.

"Electronic hazardous wastes (e-wastes) are different from industrially generated hazardous wastes in that almost every individual, institution and business generates them. Proper management and recycling of e-waste poses lower risks than managing many industrial hazardous wastes." [\[9\]](#)

"California has established special rules, known as the Universal Waste Regulations, for handling and transporting certain widely-generated, relatively low risk hazardous wastes. Universal wastes include televisions, computer monitors, computers and other electronic wastes." [\[10\]](#)

Here are some resources for managing electronic waste:

- CIWMB's [Electronic Product Management](#) Web site

- Department of General Services' [Master Services Agreement](#) (MSA) for Universal Waste recycling services
- Department of Toxic Substances Control's [Electronic Hazardous Waste](#) (E-Waste) Web site
- Department of Toxic Substances Control's [Universal Waste Rule](#) Web site
- Find local recyclers at [eRecycle.org](http://eRecycle.org).

[1] An Environmental Management System (EMS) is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency. For more information, visit the United States Environmental Protection Agency's EMS Web site at <http://www.epa.gov/ems/index.htm>.

[2] State of California, Department of General Services, IT Hardware PC Goods eRFP # DGS 5007, 2005.

[3] State of California, Department of General Services, IT Hardware PC Goods eRFP # DGS 5007, 2005.

[4] State of California, Department of General Services, IT Hardware PC Goods eRFP # DGS 5007, 2005.

[5] State of Minnesota, Request for Proposals from Manufacturers of Personal Computer Equipment and Related Devices. Available from the United States Environmental Protection Agency, Database of Environmental Information for Products and Services at

<http://yosemite1.epa.gov/oppt/eppstand2.nsf/Pages/DisplayAisle.html?Open&Computer%20Store&Computers&Type=1>. May 8, 2006.

[6] State of California, Department of General Services, IT Hardware PC Goods eRFP # DGS 5007, 2005.

[7] State of California, Department of General Services, IT Hardware PC Goods eRFP # DGS 5007, 2005.

[8] California Department of General Services. California Strategic Sourcing Initiative, IT Hardware-PC Goods Contracts - Frequently Asked Questions. Available at

<http://www.documents.dgs.ca.gov/pd/strategic/CSSIFAQlib/ITHardware-PCGoods/ITHardwarePCGOODsFAQSummary2005-07-01.pdf>. Accessed on March 24, 2006.

[9] State of California. Department of Toxic Substances Control. Electronic Hazardous Waste (E-Waste) Web page. Available at <http://www.dtsc.ca.gov/HazardousWaste/EWaste/index.cfm>. Accessed on March 24, 2006.

[10] State of California. Department of Toxic Substances Control. Electronic Hazardous Waste (E-Waste) Web page. Available at <http://www.dtsc.ca.gov/HazardousWaste/EWaste/index.cfm>. Accessed on March 24, 2006.

## Office Machines – Copiers

### Environmental and Health Issues and Recommendations



#### [Prevents Waste:](#)

Save paper with copiers that feature automatic double-sided and multi-page printing. In addition, purchasing remanufactured [toner cartridges](#) reduces the amount of material that goes to landfills and transformation facilities. Remanufactured copiers may offer environmental benefits, but newer models may have less hazardous components and improved energy efficiency.



#### [Conserves Energy:](#)

ENERGY STAR® copiers "sleep" or power down when not in use. Copiers that comply with ENERGY STAR® requirements can cut energy use 30 to 40 percent and may realize additional savings on air conditioning and maintenance. [1]





#### **Air Quality:**

Improve indoor air quality by setting performance standards for allowable emissions of ozone, particulate, styrene and volatile organic compounds. Emitted ozone concentrations should be minimized and should at a minimum comply with state and federal occupational standards.



#### **Less Hazardous:**

Keep hazardous substances out of the environment. Do not allow polybrominated biphenyls (PBB) or diphenyl ethers (PBDE). Use toner which is free of carcinogenic, mutagenic and teratogenic substances. Choose copiers that contain "Lead-Free Solder" for their printed circuit boards and contain no arsenic, cadmium, or selenium in the photoreceptor. The copiers on the 2005 State Copier Contract contain "Lead-Free Solder" which complies with the European Union [Restriction of Hazardous Substances \(RoHS\) Directive](#).



#### **End-of-Life Management:**

Give your old copier a new life. Leasing or take-back agreements that stipulate acceptable refurbishing, recycling or disposal practices ensure environmentally responsible management isn't a last-minute hassle. The 2005 State copier contract offers take back of the equipment through the distributorship. This helps ensure that copiers will not end up in landfills or transformation facilities.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Waste Prevention](#)
  - [Energy Efficiency](#)
  - [Indoor Air Quality](#)
  - [Less Hazardous](#)
- [Laws and Guidelines](#)
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## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

From everyday use to end-of-life management, copiers pose environmental concerns. Copiers are one of the most energy-intensive types of office equipment because they use energy while sitting idle for long periods of time. [2] In addition, copiers, along with printers, use large amounts of paper, too often wastefully. During use, copiers can emit dust, ozone and other substances from their inking paper processes, their image projecting process, and from their paper handling operations, thereby reducing the quality of indoor air. Internally, their components can contain toxic materials and older analog models may



have drums that can contain heavy metals such as selenium. The toxicity of these and other heavy metals poses disposal concerns.

Newer digital multifunctional copiers are replacing analog models and these new copiers offer several environmental benefits over their predecessors, some of which are highlighted below.

## **Environmental and Health Issues**

### **WASTE PREVENTION**

#### **Double-sided Copies**

Copiers with automatic double-sided copying capability help save paper and energy. Depending upon how frequently the feature is used, double-sided copying or duplexing can reduce paper use [\[3\]](#) and this in turn saves energy because it takes 10 times more energy to manufacture a piece of paper than it does to copy an image onto it. [\[4\]](#) Digital copiers now dominate the sales of new copiers and also present paper-saving opportunities through multi-page printing on a single sheet, as well as improvements in paper handling technology.

The 2005 State contract ([specification](#)) adopted standard requirements for digital copiers that range from 15 copies per minute (cpm) to 55 cpm. One of the standard features is that the copier shall be able to scan/copy double-sided documents with the exception of the 15 cpm copier. This duplexing feature is set as a default and will enable users to save approximately 30 to 40 percent in paper use. [\[5\]](#) In addition, products that can produce copy or print at the rate of 35 cpm and above can scan both sides of a double-sided document simultaneously. [\[6\]](#) This feature improves productivity and efficiency in the office compared with products that do not have this feature.

#### **Multifunctional**

With the advance of digital copiers, a single machine can provide the functions of two or more. This machine is called a MultiFunction [Peripheral \(MFP\)](#), e.g., a single [device](#) that serves several functions and can act as a [printer](#), a [scanner](#), a [fax machine](#) and a photocopier. To take advantage of multifunctional capabilities when buying new copiers, upgrade the copiers to utilize those functions and eliminate purchasing other office machines. This can reduce costs, save space and reduce energy consumption.

#### **Take Back Agreements**

By using purchase, rental, or leasing agreements that stipulate take-back of the copier when it is no longer needed, workplaces can avoid the necessity to manage the copier as a waste and avoid the liability. These agreements transfer responsibility for safe management of toxic materials to those who provide the equipment. In certain cases, depending upon the replacement schedule, old copiers can even have reuse value.

#### **Reuse**

Some manufacturers are redesigning copiers to be more easily disassembled for reuse and recycling, in order to recondition or remanufacture units and certain components for reuse. Remanufactured copiers are available for purchase, often at cost savings compared to machines with all new components.

With the introduction of digital technology, copiers with all-in-one toner cartridges are becoming more common. These cartridges may be sent to a re-manufacturer, thus saving resources and cutting waste and potential pollution. See [Toner and Inkjet Cartridges](#). See National Aeronautics and Space Administration's [\(NASA\) lease](#) as an example.

#### **Recycled Materials**

Some manufacturers are designing their copiers to maximize their recyclability and their use of

recyclables. There is opportunity for most components to be manufactured from recycled material content.

## ENERGY EFFICIENCY

It is State policy to purchase ENERGY STAR® products when cost effective. Many manufacturers offer models that comply with the requirements of [ENERGY STAR®](#), a voluntary leadership program established by the United States Environmental Protection Agency (USEPA) and the United States Department of Energy. To meet ENERGY STAR® requirements, copiers must have a power management feature that reduces energy consumption during periods of inactivity.

ENERGY STAR® Tier 2 requirements, adopted in 1997, apply to standard copier models. Tier 3 requirements, adopted in 1999, apply to large format copiers designed to handle 17" x 22" paper or larger. According to the ENERGY STAR® program, copiers equipped with low-power and automatic power-off features can save 30 to 40 percent of otherwise wasted energy.

## INDOOR AIR QUALITY

Indoor air quality is a concern for office occupants. Office machines can emit several substances that contribute to indoor air pollution and can irritate the human respiratory system . [\[7\]](#) Air contaminants that may be generated by copiers are:

### Ozone

Many copiers in the marketplace generate ozone during their operation. [\[8\]](#) One source of ozone in copiers is electrically charged corona wires used in the imaging system. In order to eliminate this source, certain low-output copiers are equipped with charged rollers instead of corona wires. Also some copiers are equipped with ozone adsorption or catalyst devices to reduce the ozone emissions. Ozone is a recognized criteria pollutant and has several recognized adverse health impacts. [\[9\]](#) The USEPA notes that ozone can cause the following health effects: decreases in lung function; aggravation of asthma; throat irritation and cough; chest pain and shortness of breath; inflammation of lung tissue; and higher susceptibility to respiratory infection. [\[10\]](#) Repeated exposure to ozone pollution for several months may cause permanent lung damage. Emitted ozone concentrations should be minimized and should at a minimum comply with state and federal occupational standards.

### Particulates

The generation of particulates may result from paper debris, toners, and inks, and the particles may vary in size. Many of these particles are in the respirable size range and pose health impacts. [\[11\]](#) Some scientists are concerned about the presence of [carbon black](#). [\[12\]](#)

### Volatile Organic Compounds (VOC)

VOCs are hydrocarbon compounds that evaporate into the air (with a few exceptions). [\[13\]](#) VOCs can cause various health problems indoors including flu-like symptoms for building occupants. A variety of VOCs has been found to be emitted by copiers. [\[14\],\[15\],\[16\]](#) The wet process technology found in older analog models emits high concentrations of VOCs and should be avoided.

## LESS HAZARDOUS

Copiers do contain some hazardous materials, which can be reduced through the use of:

- Toner that does not contain carcinogens, mutagens or teratogens.
- An organic photoreceptor, or if not organic, a photoreceptor that does not contain arsenic, cadmium, or selenium.
- Photoconductor drums that do not contain selenium, lead, mercury, or cadmium or any of their compounds as constituents.

- Plastic components that do not contain polybrominated biphenyls (PBB) or diphenyl ethers (PBDE).
- Plastic components free of cadmium, lead or mercury compounds (stabilizers).
- Ozone adsorption media or catalysts should be non-toxic and not contain heavy metals requiring special end of life management steps.
- Lead-free circuitry.

## **LAWS AND GUIDELINES**

### **California**

#### **Statute**

##### **Ban on Some Polybrominated Diphenyl Ethers (PBDE)**

The manufacture, distribution and processing of products containing pentabrominated diphenyl ether (pentaBDE) and octabrominated diphenyl ether (octaBDE) flame retardants will be prohibited in California as of June 1, 2006 ([California Health and Safety Code, Sections 108920-108923](#) as amended by AB 2587, Chan, 2004); only products manufactured after June 1, 2006 are subject to the prohibition. However, the manufacture, distribution and processing of products containing the most commonly used PBDE mixture, decabrominated diphenyl ether (decaBDE), has not been prohibited.

##### **Recycled Content**

[Public Contract Code section 12217\(f\)](#) directs state agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards. For information on procurement requirements for toner cartridges, see the Laws and Guidelines section of [Toner and Inkjet Cartridges](#).

##### **State Agency Waste Diversion**

[California law](#) [Chapter 764, Statutes of 1999 (Strom-Martin, AB 75)] requires each state agency and large state facility to divert 50 percent of their solid waste stream from landfills or transformation facilities through source reduction, recycling, and composting activities. State agencies can receive source reduction credit for [double-sided copying](#).

##### **Health Standards for VOCs**

[Proposition 65](#) defines into code [safe harbor levels](#) - no significant risk levels (NSRLs) for carcinogens and maximum allowable daily levels (MADLs) for chemicals that cause reproductive toxicity. In addition, [Chronic Reference Exposure Levels](#) are defined for implementing the Air Toxics Hot Spots program.

#### **Other**

- **Sustainable Copy Paper Policy.** Department of General Services (DGS) [Administrative Order 06-04](#) requires that new copiers and printers purchased have automatic duplex capability and computers are set up to default to two-sided printing.
- [Executive Order W-7-91](#) states, "IT IS ORDERED that all State agencies provide for...use of two-sided copying of all State documents, to the maximum extent feasible."
- [Executive Order S-20-04](#) includes a provision that state agencies, departments, and other entities under the direct executive authority of the governor purchase and operate ENERGY STAR® electrical equipment whenever cost-effective.
- State of California Purchasing Authority Manual. Chapter 3 contains environmental policies. Topic 9 requires the purchase of ENERGY STAR® products.
- State of California State Administrative Manual. [Chapter 1900](#) describes waste prevention and recycling policies.

- The ambient air quality standard for ozone can be used as an indoor guideline value for ozone because it is designed to protect the entire population. California has the most stringent standard for ozone in the United States; the 8-hour average allowable concentration is 0.070 parts per million (ppm) (137 µg/m<sup>3</sup>) and the 1 hour average is 0.09 ppm (180 µg/m<sup>3</sup>). [\[17\]](#)
- The ambient air quality standard for respirable particulate matter (PM10) is a 24 hour average of 50 µg/m<sup>3</sup>. This standard can be used as an indoor guideline value for respirable particulate matter (PM10) because it is designed to protect the entire population.

#### **Federal**

- Federal Executive Order 13123 directs federal agencies to select [ENERGY STAR®](#) compliant products, including copiers. State and local governments are encouraged to follow this direction for their copier purchases.
- USEPA's National Ambient Air Quality Standard (NAAQS) for ozone. The maximum 8-hour average allowable concentration is 0.08 ppm (157 µg/m<sup>3</sup>) and the 1-hour average is 0.12 ppm (235 µg/m<sup>3</sup>). [\[18\],\[19\]](#)
- The NAAQS for respirable particulate matter (PM10) is a 24 hour average of 150 µg/m<sup>3</sup>, and the NAAQS for fine particulate matter (PM 2.5) is a 24 hour average of 65 µg/m<sup>3</sup>. [\[20\]](#)

#### **Health Standards for Ozone [\[21\]](#)**

The [Occupational Safety and Health Administration](#) (OSHA) requires that workers not be exposed to an average concentration of more than 0.10 ppm for 8 hours.

The [National Institute for Occupational Safety and Health](#) (NIOSH) recommends an upper limit of 0.10 ppm, not to be exceeded at any time.

### **PERFORMANCE**

#### **Duplexing**

Whether making single-sided or duplex copies, users expect efficient performance. Typically, duplexing involves a little extra paper handling time compared to single-sided copying. Because duplexing efficiency varies from model to model, look for those with efficient duplex output speed. With an efficient model, users will notice very little difference in the time it takes to make single-sided versus duplex copies.

Newer digital copiers tend to be less susceptible to jamming because there is less paper handling and they generate less heat than most analog copiers. Proper storage and handling of the paper also minimizes jams. See the [Copier Paper](#) section for prevention tips. Fortunately, if the copier is properly adjusted and good quality paper used, this potential is minimal.

#### **Multi-function Copiers**

Multi-function copiers combine both printing and copying in one unit. With considerable potential for reducing overall costs, multi-function units can be equipped with a variety of features such as scanning, faxing, and document security (allowing users to access printed documents by entering a personal identification number, or PIN).

Reduced maintenance is a primary advantage. One multi-function unit can replace a copier and two to three laser printers, thus reducing the pieces of equipment to maintain. Ask your copy machine vendor for options and availability. It is likely offices will save money by switching to multi-function units and these are available on state contract.

#### **Recycled Paper Use**

In 1998, three office equipment manufacturers and the United States Government Printing Office evaluated a number of brands of 30 percent postconsumer content multipurpose paper and found that they performed as well as virgin papers. "Altogether, over 2 million sheets were tested on various types and models of copiers, laser printers, and ink jet printers for physical properties and performance." [\[22\]](#)

Recycled paper is sometimes unfairly blamed for excessive jamming, but a copier can jam for a variety of reasons, such as:

- a bad batch of paper (this can occur with both virgin and recycled paper)
- poor maintenance of the copier
- improper storage of the paper
- improper handling of the paper
- dust in the copier room [\[23\]](#)

More often than not, the machine merely needs adjusting.

Many high-quality postconsumer recycled content papers are readily available. Low-quality paper is rarely a good value, and when paper is truly at fault, the issue is quality, regardless of whether or not the paper has recycled content. In addition, remember that all contract provisions impeding the consideration of recycled products should be deleted in favor of performance standards [\[Public Contract Code section 12217\(f\)\]](#).

The 2005 State Contract Copier specification requires all copiers to be able to use paper with a minimum of 30 percent postconsumer material without any degradation of the quality of print and without an increase in service. The State encourages all users to use recycled paper at all times in copiers. New copiers available through the State Contract can use papers with a higher percentage of recycled content as long as they have the same performance characteristics as virgin paper. Several state agencies are successfully using the 100 percent postconsumer content papers that are available on contract and from [small businesses and disabled veteran business enterprises](#).

See the section on [Copier Paper](#).

## **ENERGY STAR®**

The only difference in performance of copiers with sleep features is the time it takes to "wake up" the machine after periods of inactivity. Depending upon the copier speed, ENERGY STAR® either requires or recommends a 30-second recovery time from low-power mode (many low-volume copiers are even faster). This is a small compromise for the benefits of saving energy and extending the life of the copier. The current State Contract Copier specification requires all copiers to comply with ENERGY STAR® so that the State can take advantage of energy savings when the copiers are not being used. In addition, copiers that can produce 35 cpm or more have the feature to allow scanning of both sides of a double-sided document simultaneously. This reduces energy use because it eliminates the paper passing the feeder a second time. The biggest savings come when we fully utilize the capability of the MFP capable copiers. The 2005 State Contract has a provision that allows purchasers to upgrade copiers to take advantage of their MultiFunction features. When fully equipped, a copier will be able to act as printer, networking printer, scanner and fax machine. This will allow the State to eliminate those extra machines and reduce energy use even further.

## **Low-Emitting Copiers**

Low-emitting copiers are designed to emit low concentrations of ozone, particulates, and VOCs during operation and idle. Procuring copiers that emit low levels of pollutants contributes to safer work environments.

To maintain proper operation, ozone catalysts and particulate filters must periodically be changed as part of a preventative maintenance program. Copier use causes the ozone adsorption media to be consumed and filters to become caked, thereby blocking needed airflow to the units. Proper maintenance should reduce ozone and particulate matter concentrations in office settings. Failing to maintain copiers could result in overheating and increase wear reducing the overall life of the copier and inhibiting the pollution controls. [\[24\]](#) Copiers should be equipped with indicators to alert office users to replace these control devices according to the manufacturer's instructions.

### **Noise Emissions**

Certain office environments need quiet work environments; this includes work environments where there is ongoing training and occupants need to hear information, or areas where workers talk on the phone and need to minimize noise distractions or interruptions. Decibel or other noise metrics thresholds may be useful to apply for procurement for these applications. Copiers that have noise levels exceeding 63 dB(A) should not be used in offices where intellectual work is done, but should be set up in separate rooms. [\[25\]](#)

### **AVAILABILITY**

Numerous [vendors](#) provide copiers that are environmentally preferable and meet the performance criteria required in today's offices.

### **COST**

In 2005, the state of California was able to reduce costs for new copiers, while incorporating many environmentally preferable features. [\[26\]](#)

### **Duplexing**

Automatic duplexing is available at no additional cost on most mid- and higher-speed analog models and nearly all digital models. When available as an option, adding duplex capability to low-speed analog models typically adds 25 to 30 percent to the base cost of the copier. Typically, it is not much more expensive to upgrade to a faster model that includes automatic duplexing as a standard feature than to buy a slower model and pay for duplexing as an add-on feature. Most offices can see a reduction in paper purchase costs of 30 to 40 percent. [\[27\]](#) Even greater savings can be realized in postage and storage costs, as documents copied on both sides mean fewer sheets to mail or store.

Beware of the term "manual duplexing." It means the user has to go to the copier/printer and manually feed the paper so printing occurs on both sides. This is very time consuming and results in minimal duplexing. Seek equipment with automatic duplexing.

Automatic duplexing is a standard requirement for all copiers from the current State Contract, except for those copying at 15 cpm or less. The contract was the result of the California Strategic Sourcing Initiative (CSSI) effort. The price of these copiers is 40 percent below what the State used to pay, [\[28\]](#) so there is no added cost for duplexing. The feature is set as the default so it is anticipated that paper use will be reduced.

### **Energy Use**

New copiers purchased through the State Contract are ENERGY STAR® compliant. For an estimate of Life Cycle Cost, visit the [ENERGY STAR® Web site](#). This tool estimates the lifetime energy cost and benefits for products that are ENERGY STAR® compliant.



## SPECIFICATIONS

### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

The state of California has created a standard specification (Digital Copier Specification 3610-51A-01, April 12, 2005) for 15 - 55 cpm copiers. This specification includes many environmental and energy requirements mentioned below and incorporates several environmental criteria from the USEPA guidelines.

### Others

Performance standards set minimum requirements that bidders must meet. Below are criteria that have been incorporated into copier specifications by others.

#### Duplexing

Canada's [EcoLogo](#)<sup>M</sup> criteria state that copiers producing 44 copies or more per minute must be equipped with automatic duplexing capabilities and be programmable by the end-user such that the duplexing mode may be set as the default mode. [\[29\]](#)

To increase the chances that employees in the workplace use the duplexing feature, carefully compare the output speeds for duplexing and single-sided copying. Look for a model with a duplex speed at least 80 percent as fast as single-sided copiers.

Consider specifying efficiency ratings that are above average for your preferred model's size and speed. Specify that models make duplex copies at a speed no more than a certain percentage lower than single-sided copies. Consider a minimum speed for mid-speed copiers of 40 cpm for single-sided copying and a duplex copy speed that could not be more than 25 percent lower than single-sided copying for that model.

Consider requiring that all equipment printing 15 cpm or greater include automatic duplexing and that products be delivered with automatic duplexing installed. It may be appropriate to have duplexing set as the default option.

#### Recycled Paper Use

When purchasing or leasing a copier, it is important for the contract or agreement to specifically require that the copier run as well with recycled paper (with up to 100 percent postconsumer content) as with comparable-quality virgin paper. Additionally, the contract should specify consequences for the vendor if the machine does not perform to expectations. This provides the customer with leverage should the technician claim recycled paper is to blame for excessive jamming problems.

#### Upgradeability

Specify that the copier allows for upgrades without special tools, has expandable memory, contains ample slots for expansion and other components. These features can result in extended use, which saves resources and money.

#### Design for Demanufacturing

Several equipment features can facilitate product dismantling. Specify clear and visible labels of the plastic types found in components, use of single plastic resins in larger parts, avoidance of painted parts,



avoidance of non-separable bonds (e.g., glued, welded) between different materials, presence of easily separable mechanical bonds, and reduction of the number of materials used.

### **ENERGY STAR®**

The [ENERGY STAR® Purchasing Tool Kit](#) offers sample procurement language for ENERGY STAR® compliant copiers, specifications for compliant equipment, and other helpful pointers for purchasers. The Tool Kit is available by calling ENERGY STAR® toll-free at (888) STAR-YES (888-782-7937), or by visiting the [ENERGY STAR® Web site](#).

Consider using a general specification in bid solicitations to establish a requirement for ENERGY STAR® compliance, such as the following: "All copiers must meet federal ENERGY STAR® power consumption guidelines and be shipped with the ENERGY STAR® functions enabled."

More detailed specifications may also be provided to clarify desired features. Keep in mind that in order to meet ENERGY STAR® requirements, standard copiers that make over 20 cpm and large format copiers that make over 40 cpm must enter a low-power mode after 15 minutes of inactivity. Copiers are also required to have a power off mode that engages after 30 to 90 minutes of inactivity, depending upon the copier speed.

### **Ozone Emissions**

Specifications should stipulate meeting 0.02 mg/m<sup>3</sup> measured by ASTM standard D-6670-01. The [Nordic Ecolabel](#)'s criterion for ozone is a threshold value of 0.02 mg/m<sup>3</sup> using the RAL UZ 62 protocol.

For low-output copier applications, charged rollers may be environmentally preferable instead of corona wires to reduce ozone generation. Also, copiers can be specified to be equipped with ozone adsorption or catalyst devices to reduce the ozone emissions. If such devices are included, be sure to specify that the copier be equipped with a sensor alarm to remind operators to change the ozone adsorption or catalyst device in a timely manner.

### **Particulate Emissions**

USEPA guidelines for copiers state that they should not emit dust at a concentration in excess of 0.25 mg/m<sup>3</sup>. [\[30\]](#) Canada's EcoLogo criteria state copiers should not emit particulates at a concentration that will result in room concentrations in excess of 0.25 mg/m<sup>3</sup> as measured by ASTM standard D-6670-01. [\[31\]](#) The Nordic Ecolabel's upper limit for dust is 4.0 mg/hr as described and measured by the [Blue Angel](#) RAL-UZ-62 test method. [\[32\]](#)

Specify the inclusion of High Efficiency Particulate Air (HEPA) filters to capture particulates from copiers' paper inking processes during operations.

### **Volatile Organic Compounds (VOC)**

If the copiers are going into an office where it is anticipated that children or pregnant women will be present, such as an office open to the public, or a daycare or developmental center or school, then be sure that the specifications include a stipulation that the copier be able to comply with the safe harbor levels that have been developed by California's Office of Environmental Health Hazard Assessment (OEHHA) for [Proposition 65](#). It should be specified that the copier in operation should not release any Proposition 65 listed chemicals above the no significant risk levels (NSRLs) for carcinogens or above the maximum allowable daily levels (MADLs) for chemicals that cause reproductive toxicity. It should be specified that, for copiers that do release chemicals above these limits, this fact should be disclosed in the bid process and the bidder should state how "clear and reasonable" warning could be posted so that members of the public may be aware that they may be exposed to the harmful chemicals. This includes, but is not limited to, posting signs near the copier in the workplace.

The Blue Angel Eco Label certification requires that a copier have a total VOC (TVOC) emission rate of less than 10 mg/hour when operated in the copying mode, and a benzene emission rate of less than 0.05 mg/hour and a styrene emission rate of less than 1.0 mg/hour as measured by the RAL UZ 62 test protocol. [\[33\]](#)

The GREENGUARD Environmental Institute certification is based on emission testing in an environmental chamber. Emission limits are based on the contribution of office equipment to a pollutant concentration in a room. The GREENGUARD certification ensures that a copier operating in a room with a volume of 32 cubic meters and with 0.8 air exchanges per hour will not result in elevated pollutant concentrations. These limits are less than 0.4 mg/m<sup>3</sup> for TVOCs, 0.15mg/m<sup>3</sup> for dust, 0.002 mg/m<sup>3</sup> for benzene, 0.04 mg/m<sup>3</sup> for styrene, and 0.04 mg/m<sup>3</sup> for formaldehyde. Environmental chamber testing follows ASTM standard D-6670-01. [\[34\]](#)

Specify that the copier, including its toner ink cartridge, contain no carcinogens, mutagens or teratogens.

The Nordic Ecolabel uses a threshold value of 0.07mg/m<sup>3</sup> for styrene concentrations in a defined room test.

### **Other Toxics**

Specify that an organic photoreceptor be used that does not contain arsenic, cadmium, or selenium.

Specify that the photoconductor drums shall not contain selenium, lead, mercury, or cadmium, or their compounds, as constituents. Also specify that the photoreceptor drums be taken back to the original manufacturer to be remanufactured for reuse in the equipment, or if the drums can not be reused, that the materials be recovered.

### **Take Back**

In leasing and purchase agreements for copiers, take-back clauses can be simple statements to the effect that the vendor agrees to take back the copier at the end of its useful life, or at a specified date or usage limit (e.g., a specified number of images). At a minimum, the clause should require the vendor to certify that all recyclable components are recycled and that components that are not reused or recyclable are processed to remove and recycle lead-bearing circuit boards and any selenium drums and disposed of properly.

Also see the [USEPA guide](#) for federal purchasers, which has many of the aforementioned topics. Refer to the [Nordic Ecolabel](#) for additional criteria and descriptions.

### **Recyclability of Plastic Parts**

It is environmentally preferable that the plastic components in the copier be made of common recyclable plastics, easy to dismantle without special tools, marked with an [ISO 11 469](#) or an equivalent recycling labeling system, and not painted or varnished in a way that reduces the recyclability of the material.

### **Remanufactured and Recyclable Toner Cartridges**

When writing specifications, state agencies should ensure that the equipment can use State Agency Buy Recycled Campaign (SABRC)-compliant [toner cartridges](#).

### **Recycled Content for Plastic and Metal Parts**

Criteria can be set to maximize the use of postconsumer recycled materials in the copier units, especially in larger parts.

### **Packaging Materials**

Set criteria to maximize the use of reusable and/or postconsumer content packaging materials. See the Electronic Product Environmental Assessment Tool (EPEAT) packaging criterion (4.8) for suggestions.

### Noise Emissions

Copiers should be specified to have [noise](#) levels below 63 dB(A). [\[35\]](#)

### *Sample Copier Specifications and Environmental Criteria*

#### California Department of General Services

Germany's [Blue Angel](#) Eco Label Certification Program. Basic Criteria for Award of the Environmental Label, Copiers RAL-UZ 62.

**Federal Electronics Challenge.** [Product Environmental Assessment for Printers, Copiers, and Other Electronics](#).

**Greenguard Environmental Institute.** [Allowable Emission Levels](#).

**State of Massachusetts.** [Copier Specification](#).

**Nordic Ecolabelling.** [Criteria of Copying Machines, Printers, Fax Machines, and Multifunctional Devices, 2001-2007](#). Labeling criteria used in Europe. In this case, the Nordic Ecolabel is harmonized with the Japan Environment Association, and its criteria are at the forefront of advancing the environmental performance of office equipment. These criteria include additional categories such as noise.

**City of Seattle.** [Questionnaire for Copier Vendors](#), 2002. Provides a comprehensive and concise overview of environmental criteria.

**United States Environmental Protection Agency (USEPA).** [Database of Environmental Information for Products and Services](#). This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services. If you have a specification for an environmentally preferable product or service, consider asking the [USEPA](#) to include it in this database.

## VENDORS

### California State Contracts

Several copiers are available through the mandatory statewide copier contract (contract number 1S-05-36-20) that meet several criteria identified in USEPA guidelines. See also the "Contract Usage/Rules" section of the contract. This contract is for 15 cpm - 55 cpm copiers. Models are available through the vendor -- Sharp Electronics -- and their authorized distributors. A [catalog](#) is available online. Recycled paper -- with up to 100 percent postconsumer content -- to use in copiers is available through the statewide office supply contract (contract number 1-01-75-55.)

Local agencies may use State procurement contracts.

### California Multiple Award Schedules (CMAS)

Copiers that are not available from the Statewide contract shall be purchased through [CMAS](#). Vendor information can be found through the [CMAS Web site](#). Users of CMAS are encouraged to use the State's [specification](#) for copiers. This will ensure the products will meet the State Standard.

[Local agencies](#) may use State procurement contracts.

## SUCCESS STORIES

## **NASA's Innovative Leasing, [Cost-Per-Copy Contract](#)**

### **Other**

Double-sided copying is a key component of any office paper waste reduction program. See the following Web sites for information on how individual organizations are saving paper through double-sided copying and other office paper waste reduction techniques.

- California Integrated Waste Management Board (see "Efficient Use of White Office Paper")
- New York, New York
- Organizations in Oregon

## **RESOURCES AND WEBSITES**

### **[California Integrated Waste Management Board \(CIWMB\)](#)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. The CIWMB maintains a [Creating a Paper Reduction Campaign in Your Office](#) Web page.

### **[ENERGY STAR®](#)**

Washington, DC  
(888) STAR-YES (888-782-7937)

ENERGY STAR® is a partnership program of the United States Environmental Protection Agency, the United States Department of Energy, and the private sector that secures voluntary participation of manufacturers to meet energy conservation standards for products and equipment. See the [Copiers Web page](#) for procurement language, a savings calculator, and a searchable list of ENERGY STAR®-qualified copiers.

### **[GREENGUARD Environmental Institute \(GEI\)](#)**

Atlanta, GA  
(800) 427-9681

The GEI is an independent, non-profit organization that oversees the GREENGUARD Certification Program for Low Emitting Products. It has created GREENGUARD Certification Standards for Low Emitting Products for the Indoor Environment.

### **[United States Department of Energy - Federal Energy Management Program \(FEMP\)](#)**

Washington, DC  
(800) 363-3732

The FEMP was designed to reduce the cost and environmental impact of Federal agencies by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at Federal sites. The FEMP provides a variety of resources to help any purchaser more readily identify energy compliant (ENERGY STAR®) products and find ways to save money, energy and natural resources in the office. See the following on-line resources:

- [How to Buy an Energy-Efficient Copier](#)
- ["Greening Federal Facilities"](#) (Section 5.5.1-Office Equipment)

### **[United States Environmental Protection Agency \(USEPA\)](#)**

Washington, DC  
(202) 272-0167

The USEPA maintains a web page on [green copier attributes](#).

- [1] United States Environmental Protection Agency and United States Department of Energy. ENERGY STAR Copiers Web page. Available at:  
[http://www.energystar.gov/index.cfm?fuseaction=find\\_a\\_product.showProductGroup&pgw\\_code=IEQ](http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=IEQ).
- [2] United States Environmental Protection Agency and United States Department of Energy. ENERGY STAR Copiers Web Page. Available at  
[http://www.energystar.gov/index.cfm?fuseaction=find\\_a\\_product.showProductGroup&pgw\\_code=IEQ](http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=IEQ).
- [3] As explained by Lawrence Berkeley National Laboratory, the highest percent of paper reduction from duplexing is 50% (even paged document), while it is 25% for a 3-image document that goes from 4 sheets to 3 sheets. See <http://eetd.lbl.gov/paper/ideas/html/duplexrates.htm>.
- [4] Commonwealth of Massachusetts. Environmentally Preferable Products Procurement Program, Product Information: Photocopier Equipment, Supplies & Service, Energy Efficient (Including Remanufactured) Web page.
- [5] The assumption is that 50 percent of the time, you will copy more than two pages.
- [6] Sharp Electronics Corporation. Double Your Productivity with Scan<sup>2</sup> technology Web page. Available at <http://www.sharppusa.com/products/business/scan2/0,2577,,00.html>.
- [7] For additional information on indoor air contaminants, see the United States Environmental Protection Agency Report titled, "Office Equipment: Design, Indoor Air Emissions, and Pollution Prevention Opportunities."
- [8] P. Wolkoff, C.R. Johnsen, C. Franck, P. Wilhardt, and O. Albrechtsen. A study of human reaction of office machines in a climatic chamber. J Exp Anal Environ Epidemiol Suppl. 1992;1:71-96.
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- [10] See United States Environmental Protection Agency publication titled "Ozone and Your Health." Available at <http://www.airnow.gov/>.
- [11] A.B. Stefaniak, P.N. Breyse, P.M. Murray, B.C. Rooney, and J. Schaefer. An evaluation of employee exposure to volatile organic compounds in three photocopy centers. Environmental Research. 2000;83(2):162-173.
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- [13] State of California. California Air Resources Board. Glossary of Air Pollution Terms. Available at <http://www.arb.ca.gov/html/gloss.htm>.
- [14] R. Hetes, M. Moore, C. Northelm. Office equipment: Design, indoor air emissions, and pollution prevention opportunities. United States Environmental Protection Agency Project Summary, EPA/600/SR-95/045; Research Triangle Park, North Carolina. 1995.
- [15] S. K. Brown, Assessment of Pollutant Emissions from Dry-Process Photocopiers. Indoor Air, Volume 9, Issue 4, Page 259 - December 1999 doi:10.1111/j.1600-0668.1999.00005.x
- [16] S.C. Lee, Sanches Lam, Ho Kin Fai, "Characterization of VOCs, ozone, and PM10 emissions from office equipment in an environmental chamber", Building and Environment 36 (2001) 837-842.
- [17] See complete listing of Ambient Air Quality Standards. Available at  
<http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>
- [18] The United States Environmental Protection Agency, Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards. See <http://epa.gov/air/criteria.html#1>.
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- [21] United States Environmental Protection Agency. Ozone Health Effects and Standards. See [http://www.epa.gov/iaq/pubs/ozonegen.html#table\\_1](http://www.epa.gov/iaq/pubs/ozonegen.html#table_1).
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- [33] See "Basic Criteria for Award of the Environmental Label. Copiers RAL-UZ 62" from Blue Angel.
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- [35] See the EN ISO 7779 and ISO 9296. Also see the Nordic Swan noise requirements that are available at <http://www.svanen.se/en/>

## Office Machines – Laser Printers

### Environmental and Health Issues and Recommendations



#### Conserves Energy:

ENERGY STAR® printers "sleep" or power down when not in use. Printers that comply with ENERGY STAR® requirements can cut energy use by 60 percent and may realize additional savings on air conditioning and maintenance.



#### Prevents Waste:

- Printers that last longer than their counterparts can save resources that go into making printers. Manufacturers should ensure the availability of spare parts.
- Select printers that have a recyclable design, which may include labeled parts, minimal coatings, and easy dismantling.
- Save paper with printers that feature automatic double-sided printing.
- Less waste occurs when using remanufactured [toner cartridges](#) and when color toner modules can be replaced separately.
- Save resources by sharing printers; several computers can use one printer.



#### Air Quality:

Improve indoor air quality by setting performance standards for allowable emissions of ozone, particulate, styrene, benzene, and volatile organic compounds (VOC).





### **Recycled Content:**

Ask if printers, toner modules, and packaging are made with postconsumer recycled content materials and are recyclable. Make certain the printer operates effectively with 100 percent postconsumer content [paper](#).



### **Less Hazardous:**

Less Hazardous: Keep hazardous substances out of the environment.

- Do not allow polybrominated biphenyl (PBB) or diphenyl ether (PBDE) flame retardants; pigments with lead or cadmium, or substances which can cause the formation of dioxins or furans.
- Use toners that are free of carcinogenic, mutagenic, and teratogenic substances.
- Choose printers that contain lead-free solder for their printed circuit boards and contain no lead, mercury, cadmium, or selenium in the photoreceptor.



### **End-of-Life Management:**

- At end-of-life, laser printers should be managed in accordance with state laws and regulations (for more information, contact the [Department of Toxic Substances Control](#)).
- Leasing or take-back agreements that stipulate acceptable recycling or disposal practices can ensure environmentally responsible management doesn't become a last-minute hassle.
- Recycle laser printers whenever possible. See "[Electronic Waste Recycling Services](#)" under the Vendors heading. In addition, you can find local electronic equipment recyclers at [eRecycle.org](#).

**Noise:** Seek quiet printers, especially if they are going to be used in office areas, rather than a separate room.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications and Environmental Considerations](#)
- [Vendors](#)
- [Success Story](#)
- [Resources and Web Sites](#)

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

State agencies purchase on an annual basis more than \$90 million dollars worth of Personal Computer (PC) Goods, which includes \$7 million in printers. By practicing environmentally preferable purchasing (EPP), the state of California could realize great savings by reducing energy consumption and purchasing products that have less hazardous materials.

## Environmental and Health Issues

Laser printers are commonplace in workplaces today and have several environmental and health impacts. Laser printers can use significant amounts of energy, even when not in use. During use, printers can emit dust, ozone and other substances from their image projecting process and from their paper handling operations, thereby reducing the quality of indoor air. Paper may be used unnecessarily - especially when the output is only printed on one side. Internally, printer components can contain toxic materials that pose disposal concerns.

Fortunately, there are several ways to address these issues.

Many printer manufacturers participate in the [ENERGY STAR®](#) program, a voluntary leadership program established by the United States Environmental Protection Agency (USEPA) and the United States Department of Energy. This program requires printers to have a power-management feature and establishes maximum energy consumption during "sleep" mode to save energy. This has even greater impact on energy use in offices where printers are left on overnight.

Several [environmental labeling programs](#) have set standards for allowable emissions of dust, ozone, and other substances. Furthermore, environmental labeling standards cover much more, such as recyclable design, take back of equipment, repair assurance, energy efficiency, noise emissions, and material requirements for plastics, batteries, toner modules, and packaging. Selecting equipment that conforms to standards helps ensure a healthier workplace and environment.

Finally, purchase fewer printers by linking several computers to a single printer or even a multi-functional device. Larger printers and multi-functional devices operate at higher speeds and offer more features such as automatic duplexing. For more information on multi-functional devices, see the [Copiers](#) section.

## LAWS AND GUIDELINES

### California

#### *Statute*

##### **Polybrominated Diphenyl Ethers (PBDE)**

[California Health and Safety Code section 108922](#) states "On and after June 1, 2006, a person may not manufacture, process, or distribute in commerce a product, or a flame-retarded part of a product, containing more than one-tenth of 1 percent of pentaBDE or octaBDE, except for products containing small quantities of PBDEs that are produced or used for scientific research on the health or environmental effects of PBDEs."

##### **Recycled Content**

[Public Contract Code section 12217\(f\)](#) directs state agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards. For information on procurement requirements for toner cartridges, see the Laws and Guidelines section of [Toner and Inkjet Cartridges](#).

##### **State Agency Waste Diversion**

California law [Chapter 764, Statutes of 1999 ([Strom-Martin, AB 75](#))] requires each state agency and large state facility to divert 50 percent of their solid waste stream from landfills or transformation facilities through source reduction, recycling, and composting activities. State agencies can receive source

reduction credit for [double-sided copying](#), and equipment that can print double-sided effectively is essential.

### Health Standards for VOCs

[Proposition 65](#) defines into code [safe harbor levels](#) (PDF, 58 KB) - no significant risk levels (NSRLs) for carcinogens and maximum allowable daily levels (MADLs) for chemicals that cause reproductive toxicity. In addition, [Chronic Reference Exposure Levels](#) are defined for implementing the Air Toxics Hot Spots program.

See also [End-of-Life Management](#).

#### Other

- Sustainable Copy Paper Policy. Department of General Services (DGS) [Administrative Order 06-04](#) (PDF, 57 KB) requires that new copiers and printers purchased by state agencies have automatic duplex capability and that computers are set up to default to two-sided printing.
- [Executive Order W-7-91](#) states, "IT IS ORDERED that all State agencies provide for...use of two-sided copying of all State documents, to the maximum extent feasible."
- [Executive Order S-20-04](#) includes a provision that state agencies, departments, and other entities under the direct executive authority of the governor purchase and operate ENERGY STAR® electrical equipment whenever cost-effective.
- [State of California Purchasing Authority Manual. Chapter 3](#) (PDF, 309 KB) contains environmental policies. Topic 9 requires the purchase of ENERGY STAR® products.
- State of California State [Administrative Manual. Chapter 1900](#) describes waste prevention and recycling policies.
- The ambient air quality standard for ozone can be used as an indoor guideline value for ozone because it is designed to protect the entire population. California has the most stringent standard for ozone in the United States; the 8-hour average allowable concentration is 0.070 parts per million (ppm) (137 µg/m³) and the 1 hour average is 0.09 ppm (180 µg/m³). [\[1\]](#)
- The ambient air quality standard for respirable particulate matter (PM10) is a 24 hour average of 50 µg/m³. This standard can be used as an indoor guideline value for respirable particulate matter (PM10) because it is designed to protect the entire population.

#### Federal

- Federal Executive Order 13123 (PDF, 107 KB) directs federal agencies to select ENERGY STAR® compliant products, including computer equipment. State and local governments are encouraged to follow this direction for their purchases.
- USEPA's National Ambient Air Quality Standard (NAAQS) for ozone. The maximum 8-hour average allowable concentration is 0.08 ppm (157 µg/m³) and the 1-hour average is 0.12 ppm (235 µg/m³). [\[2\],\[3\]](#)
- The NAAQS for respirable particulate matter (PM10) is a 24 hour average of 150 µg/m³, and the NAAQS for fine particulate matter (PM 2.5) is a 24 hour average of 65 µg/m³. [\[4\]](#)

### Health Standards for Ozone [\[5\]](#)

The [Occupational Safety and Health Administration](#) (OSHA) requires that workers not be exposed to an average concentration of more than 0.10 ppm for 8 hours.

The [National Institute for Occupational Safety and Health](#) (NIOSH) recommends an upper limit of 0.10 ppm, not to be exceeded at any time.

## PERFORMANCE

Some top performing printer manufacturers in the United States have printers that conform to [environmental standards](#) developed for use in other countries. [\[6\]](#)

### **ENERGY STAR®**

The only difference in the performance of laser printers with sleep features is the few seconds it takes to "wake up" the machine from sleep mode. This is a small compromise for the benefits of saving energy and extending the life of the printer.

### **Automatic Duplexing**

Printers with automatic double-sided printing capability help save paper and energy. Depending upon how frequently the feature is used, double-sided copying or duplexing can reduce paper use [\[7\]](#) and this in turn saves energy because it takes more energy to manufacture a piece of paper than it does to make an image onto it. [\[8\]](#) Beware of the term "manual duplexing." It means the user has to go to the printer and manually feed the paper so printing occurs on both sides. This is very time consuming and results in minimal duplexing. Seek equipment with *automatic* duplexing.

Duplexing complicates the path that paper must travel before coming out of the printer. This can have two effects. First, it slightly slows down the output of the printer, although the efficiency of models in duplexing mode will vary.

Second, the extra paper handling involved can potentially increase the risk of paper jams. However, if the printer is properly adjusted and good quality paper is used, this risk is very minimal. Proper storage and handling of the paper also minimize jams (see also the Performance section of [Copier Paper](#)). Printer performance has improved significantly over the years.

### **Dedicated Trays**

With multiple paper choices, users need to decide which tray to select when they set up each print job. Setting up profiles in the user's software for different types of print jobs makes it easier to take advantage of the paper-saving potential of multiple trays. For example, a profile called "cover letter" can be set up to tell the printer to pull the first page from a dedicated letterhead tray and the remaining pages from the plain paper tray.

When using a dedicated tray for printing on reused paper, it is important to pay attention to paper quality. While most paper that is in good condition should go through the printer without jamming, paper that is in marginal condition, such as paper with folds, bends, dog-eared corners, or ripples, should not be used in a dedicated tray. This paper may instead be set aside for use in the manual feed tray or for scratch paper. Paper with staples should not be run through a printer.

## **AVAILABILITY**

### **Printers with [Environmental Certifications](#)**

Numerous laser printers have earned environmental certifications. Germany's Blue Angel certification lists some printers that are available on state contract. For example, Hewlett-Packard (HP) has several printers on state contract with Blue Angel certification.

### **Automatic Duplexing Units**

Typically, duplex units are available on higher-speed printers, such as those rated to print 12 or more sheets per minute, one-sided. Printers rated at 40 or more sheets per minute typically have automatic duplexing as a standard feature.

### **ENERGY STAR®**

Hundreds of laser printers have been certified as [ENERGY STAR®](#) compliant. See also [Vendors](#).

## **COST**

### **Duplex Units**

Some of the higher-speed laser printers come with a duplex unit at no additional cost. It is expected that duplex units will become standard on an increasing share of models in the coming years. Adding a duplex unit as an accessory typically increases the cost of a laser printer by about 15 percent to 20 percent (\$250 to \$400 is common). However, any extra costs for a duplex unit should be balanced with savings in paper costs from regular use of this feature.

Most offices can see a reduction in paper purchase costs of 10 percent to 40 percent because of duplex printing. [9] Even greater savings can be realized in postage and storage costs, since documents printed on both sides mean fewer sheets to mail, file, and store.

### **Dedicated Trays**

Higher-speed laser printers often have multiple paper trays as standard features, but additional trays can be added for \$200 to \$800, depending upon the features of the tray. Additional paper trays can be added to lower-speed printers, typically for about \$100 to \$200.

### **ENERGY STAR®**

[ENERGY STAR®](#) compliant printers save money by cutting energy costs, and typically cost no more to buy than comparable models without power-management features. Visit the [ENERGY STAR® Web site](#) for a calculator to estimate energy cost savings for your office.

### **Take-Back**

Take-back clauses may or may not save money overall. A vendor may seek to charge an upfront disposal fee or incorporate the cost of disposal or recycling in the purchase cost of the equipment. In some cases, there may be no difference in price. However, consider the cost your organization will face for proper disposal and recycling, and the cost of staff time to arrange for it, if your contract does not include a take-back requirement.

### **Remanufactured Toner Cartridges**

In response to the popularity of money-saving remanufactured toner cartridges, some laser printer manufacturers who sell replacement cartridges have issued warranty restrictions on their printers. These restrictions go into effect if used cartridges are not replaced with original equipment manufacturer's cartridges or new cartridges. This move appears to be a reaction to a loss of market share for accessories, rather than a significant history of remanufactured cartridges failing and causing mechanical damage to a printer.

The confidence in the quality of remanufactured cartridges has led many re-manufacturers to offer guarantees on their cartridges to cover any damage to printers that can be attributed to a failed cartridge. However, this does not address the customer's warranty relationship with the printer manufacturer.

It is important that any bid solicitation for laser printers include a requirement that the printer warranty will not be voided or negatively affected in any way if remanufactured cartridges are used. This should ensure that the manufacturer will not refuse to conduct repairs to a printer simply because a remanufactured cartridge is in the machine - particularly repairs that are unrelated to any problems a cartridge could possibly have caused.

## **SPECIFICATIONS AND ENVIRONMENTAL CONSIDERATIONS**

### **California**

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services

develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

### Environmental Certifications

Specification writers may incorporate performance criteria by inserting exact text or by reference (e.g., citing a document with specific criteria). Several environmental labeling programs cover laser printers and these programs identify specific criteria that must be met. Topics may include energy consumption, marking of plastics parts, chemical emissions, material composition, repair assurance, take-back of equipment, noise emissions, automatic double-sided printing, and packaging.

- **Nordic Swan (Denmark, Norway, Iceland, Sweden, Finland)** has criteria for printers and a list of certified products.
- **Eco Mark (Japan)** has [criteria](#) (PDF, 318 KB) for printers.
- **Environmental Choice (Canada)** has criteria for printers.

In the United States, the [Electronic Product Environmental Assessment Tool](#) (EPEAT) is used to certify computer products, but EPEAT doesn't include printers, although it may in the future. Meanwhile, the Federal Electronics Challenge's [Product Environmental Information Sheet](#) (PDF, 90 KB) can be used to solicit product information from manufacturers for products not covered under EPEAT, such as printers. It has a checklist covering the elements found in many of the printer environmental criteria used in other countries. For products that are not certified under an acceptable environmental labeling program, consider asking vendors to submit Product Environmental Information Sheets that have been completed by the printer manufacturer.

### ENERGY STAR®

It is State [policy](#) to purchase ENERGY STAR® products when cost effective. Many manufacturers offer models that comply with the requirements of [ENERGY STAR®](#), a voluntary leadership program established by the United States Environmental Protection Agency (USEPA) and the United States Department of Energy. To meet ENERGY STAR® requirements, printers must have a power management feature that reduces energy consumption during periods of inactivity. According to the ENERGY STAR® program, printers that have earned the ENERGY STAR can cut the equipment's electricity use by over 60 percent. The ENERGY STAR® program has sample procurement language to use in purchasing ENERGY STAR® compliant printers.

### Design for Reuse and Recycling

A variety of approaches are being used to encourage reuse and recycling of equipment and parts. These approaches are sometimes referred to as "design for end of life" or "recyclable design." Approaches include using fewer types of plastics, limiting the use of coatings, and requiring labels on major plastic parts according to the [International Organization for Standardization](#) (ISO) Standard 11469:2000. Additional strategies include designing the printer so it can be easily dismantled by one person using simple tools.

### Air Quality

Both the Nordic Swan criteria and Blue Angel criteria use the same maximum permissible values of emission rates covering Total Volatile Organic Compounds (TVOC), benzene, styrene, ozone and dust in units of mg/hour. Refer to these standards for sample language.

### Noise

Noise is defined as unwanted sound and is known to have several adverse effects on people, including hearing loss, speech and sleep interference, physiological responses, and annoyance. Based on these known adverse effects, the federal government, the state of California, and many local governments have established criteria to protect public health and safety and to prevent disruption of certain activities. [\[10\]](#)



Sound is measured in units of *A-Weighted Sound Level*, commonly called dBA. The dB refers to a measurement in decibels. For reference, the outdoor noise limit in many California communities is 55 dBA and the California Collaborative for High Performance Schools (CHPS) set the maximum noise level for unoccupied classrooms at 45 dBA as a prerequisite for the designation of a high performance classroom. [\[11\]](#) Several local governments in California have allowable noise emissions for interior spaces set at 45 dBA. [\[12\]](#) Printers may be located in separate rooms to reduce their impact.

Both the Nordic Swan criteria and Blue Angel criteria address noise using a formula to determine the maximum level of noise allowable, which is based on the speed of the printer, expressed in copies or pages printed per minute. Printers that print more pages per minute are allowed to emit more noise.

Additionally, both the Nordic Swan and Blue Angel criteria state the noise emissions from the product must be measured in accordance with the method specified in ISO 7779 and the A-weighted sound level LWAd. Also, it must be declared in accordance with the ISO 9296 in force at the time of application. Refer to these standards for sample language.

### **Reduce Hazardous Materials**

Hazardous materials may be found in several printer components, including batteries, plastic components, printed circuit boards, toner modules, and electro photographic devices. Substances of concern include cadmium, lead, mercury, chemicals used in production, and brominated flame retardants. Both the Nordic Swan criteria and Blue Angel criteria address hazardous materials. Refer to these standards for sample language.

### **Reduce Packaging Waste**

A number of steps can be taken to minimize packaging waste. Below is sample specification language from a State of California bid package:

It is desirable that bidder(s) use recyclable, non-toxic packaging and various source reduction efforts as follows:

- Use reduced and/or recycled packaging for shipping, such as boxes that contain a minimum of 35 percent post-consumer fiber for all corrugated cardboard.
- Minimize quantity and weight of any non-recyclable packaging and shipping material; e.g., use molded paper or cardboard substitutes for polystyrene and Styrofoam.
- Provide product user manuals that can be easily recyclable (no difficult binding) and printed on recycled content paper (with at least 30 percent post-consumer fiber content). [\[13\]](#)

Also see [EPEAT](#) requirements for packaging. Although written for computers, much of it can apply to printers. EPEAT covers:

- Reduction/elimination of intentionally added toxics in packaging,
- Separable packing materials
- Packaging 90 percent recyclable and plastics labeled
- Declaration of recycled content
- Minimum post-consumer content guidelines
- Provision of take-back program for packaging
- Documentation of reusable packaging

### **End of Product Life**

#### **• Take Back**

A growing number of computer manufacturers and distributors are responding to the environmental and financial interests of their customers by offering to take back their equipment at the end of its service life. In both leasing agreements and purchase contracts, take-back clauses help ensure that a product's disposal is a responsibility of the manufacturer. This in turn can encourage product design that facilitates the recovery of materials and parts. These clauses

should ask for a description of a system that is in place to recover and reuse or recycle any toxic or hazardous components and parts. The state of New Mexico has [sample specification language](#) that calls for compliance with the European Union's directive on Waste Electrical and Electronic Equipment. Germany's Blue Angel criteria include take back language for batteries, photoconductor drums, and toner modules. [14]

- **Reuse, Refurbishment, Recycling, and Disposal**

Although EPEAT currently does not cover printers, it may in the future. [EPEAT](#) requires that manufacturers provide a take-back or recycling service that meets the United States Environmental Protection Agency's (USEPA) "Plug-In to eCycling: Guidelines for Materials Management". These guidelines address activities that follow collection: reuse, refurbishment, recycling and disposal, including when materials are exported. Retailers and manufacturers who are partners with the USEPA agree to use these guidelines.

## VENDORS

### California State Contracts

#### Printers

The California Department of General Services (DGS) develops and administers contracts for goods and services that have environmental attributes. Many of these contracted products and services are healthier and safer for people, and protect the environment. Printers are included in a mandatory PC Goods Contract. All printers are ENERGY STAR® compliant and some are certified by Germany's Blue Angel program (see also the [Availability](#) section); many include automatic duplexing. Automatic duplexing is recommended by the [Federal Energy Management Program](#) and required in DGS [Administrative Order 06-04](#) (PDF, 57 KB).

[Local agencies](#) may use state of California procurement contracts.

#### Electronic Waste Recycling Services

The DGS has a Master Services Agreement (MSA) that is designed to provide electronic waste recycling services for a variety of products, including printers. To use this MSA, state agencies must first receive approval for discarding their electronic equipment from the DGS's State Property Reuse Program (via the STD 152 form process). Any local government can use this MSA, if this MSA is acceptable for their purposes. For additional information, visit the DGS's Electronic Waste Recycling Services Web site.

#### Other

Find local electronic equipment recyclers at [eRecycle.org](#).

## SUCCESS STORY

See the [Laser Printers](#) section of the *Environmentally Preferable Purchasing Guide* published by the Solid Waste Management Coordinating Board of Minnesota.

## RESOURCES AND WEBSITES

### [California Integrated Waste Management Board \(CIWMB\)](#)

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the CIWMB's Web site for information on [creating a paper reduction campaign](#), [measuring the success of paper reduction efforts](#), and [buying environmentally preferable paper](#) to use in printers.

### **ENERGY STAR®**

Washington, DC

(888) STAR-YES (888-782-7937)

ENERGY STAR® is a partnership program of the United States Environmental Protection Agency, the United States Department of Energy, and the private sector that secures voluntary participation of manufacturers to meet energy conservation standards for products and equipment.

### **United States Department of Energy - Federal Energy Management Program**

Washington, DC

(800) 363-3732

The FEMP was designed to reduce the cost and environmental impact of Federal agencies by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at Federal sites. The FEMP provides a variety of resources to help purchasers more readily identify energy compliant (ENERGY STAR®) products and find ways to save money, energy and natural resources in the office. See [How to Buy an Energy-Efficient Computer Printer](#) (PDF, 67 KB).

### **How Stuff Works**

A Web site that explains how laser printers and other equipment work.

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[1] See complete listing of Ambient Air Quality Standards. Available at <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>.

[2] The United States Environmental Protection Agency, Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards. See <http://epa.gov/air/criteria.html#1>.

[3] United States Environmental Protection Agency. Mid-Atlantic Air Protection. Frequently Asked Air Questions Web page. Available at <http://www.epa.gov/reg3artd/faqs/APDFAQ.htm>. Accessed on June 1, 2006.

[4] The United States Environmental Protection Agency, Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards. See <http://epa.gov/air/criteria.html#1>.

[5] United States Environmental Protection Agency. Ozone Health Effects and Standards. See <http://www.epa.gov/iaq/pubs/ozonegen.html#table 1>.

[6] E-mail communication with Brian Zuber, Hewlett-Packard representative, and Kathy Frevert, from the California Integrated Waste Management Board, 6/20/06 and 6/21/06. Models with Blue Angel certification are manufactured to those standards regardless of where they are sold. However, take back provisions specific to Germany, would not apply to units sold in the United States.

[7] As explained by Lawrence Berkeley National Laboratory, the highest percent of paper reduction from duplexing is 50 percent (even paged document), while it is 25 percent for a 3-image document that goes from four sheets to three sheets.

[8] Commonwealth of Massachusetts. Environmentally Preferable Products Procurement Program, Product Information: Photocopier Equipment, Supplies & Service, Energy Efficient (Including Remanufactured) Web page. Available at <http://www.mass.gov/epp/products/copier.htm#benefits>. Note: this Source says "...it takes 10 times more energy to manufacture a piece of paper than it does to copy an image onto it." Given copiers use more energy than printers (based on the assumptions found in Energy Star calculators), the savings are even greater for printers.

[9] Solid Waste Management Coordinating Board of Minnesota, *The Environmentally Preferable Purchasing Guide*, 6.3 *Laser Printers*. Accessed on September 15, 2006. Available at: <http://www.rethinkrecycling.com/government/eppg/-buy-products-services/office-machines-and-accessories>

[10] LSA Associates, Inc. Environmental Conditions Noise, Folsom Lake State Recreation Area, April 2003, page N2. Available at: <http://www.parks.ca.gov/pages/500/files/Noise.pdf>.

[11] California Air Resources Board and California Department of Health Services, *Report to the California Legislature, Environmental Health Conditions in California's Portable Classrooms*, Nov. 2004. Page 7. Available at: [http://www.arb.ca.gov/research/indoor/pcs/leg\\_rpt/pcs\\_r2l\\_es.pdf](http://www.arb.ca.gov/research/indoor/pcs/leg_rpt/pcs_r2l_es.pdf)

[12] LSA Associates, Inc. Environmental Conditions Noise, Folsom Lake State Recreation Area, April 2003, page N11, available at: <http://www.parks.ca.gov/pages/500/files/Noise.pdf>. This report shows dBA allowable by several communities.

[13] State of California. IT Hardware PC Goods eRFP # DGS 5007, April 2005.

[14] German Institute for Quality Assurance and Certification, *Basic Criteria for the Award of the Environmental Label, Blue Angel, Printers RAL-UZ 85*, January 2005. Pages 10, 11, 19, and 20.

## Office Machines – Toner and Inkjet Cartridges

### Environmental and Health Issues and Recommendations



#### Prevents Waste:

Remanufactured toner cartridges save resources by reusing components instead of disposing of them after one use.

- State agencies should purchase cartridges that meet the requirements set forth in [statute](#).



#### End-of-Life Management:

Buy from a cartridge remanufacturer or an equipment supplier that will take spent cartridges back or utilize the [recycling contracts](#) negotiated by the California Integrated Waste Management Board (CIWMB).

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycling](#)
  - [Source Reduction](#)
  - [Indoor Air Quality](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Tips on Buying Cartridges](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

### BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Each year, millions of empty toner and inkjet cartridges used in printers, fax machines, and copiers are thrown in the trash, destined for landfills and incinerators. Buying locally remanufactured toner and inkjet cartridges, and recycling empty cartridges, is an easy way for government agencies and public institutions to reduce the environmental impact of these discarded products, while also saving substantial tax dollars

and bolstering the local economy. Any office equipment that uses a replaceable toner or inkjet cartridge should be able to use remanufactured cartridges.

Remanufactured toner and inkjet cartridges offer clear advantages over new cartridges in cost, waste reduction, and sometimes even in product quality. They are suitable for use in many printers, copiers, fax machines, and other devices using all-in-one cartridges. (Imaging systems that have separate drums and toner bottles are the exception.) The quality of remanufactured and/or recharged laser printer toner cartridges has improved dramatically since these products were first introduced more than ten years ago. High-quality remanufactured cartridges now undergo a process that renders cartridges equivalent in performance, print quality and page yield to new models and that meet all original equipment manufacturer (OEM) standards and specifications. Moving away from the original "drill and fill" method that created the industry's initial problems, the current remanufacturing process now requires that the cartridges be disassembled and inspected to determine any problem areas. Worn components are replaced with new parts; all sections are completely cleaned, and a fresh supply of toner is added before the cartridge is resealed.

Most cartridge remanufacturers accept spent cartridges, reducing user-generated waste. Some OEM suppliers offer end-of-life recycling if you buy new cartridges from them. While not offering the same environmental or economic benefits as buying remanufactured cartridges, this option does prevent spent cartridges from becoming waste.

## **Environmental and Health Issues**

### **RECYCLING**

Recycling toner and inkjet cartridges is a process of collecting, sorting, cleansing, treating, or reconstituting for the manufacture of new products or the remanufacture of used cartridges.

The typical used toner cartridge weighs about three pounds and is composed of 40 percent plastic, 40 percent metal and smaller percentages of rubber, paper, foam and toner. The plastic is made of engineering-grade polymers and takes at least 1,000 years to decompose. However, approximately 97 percent of these combined components can be recycled or reused. [\[1\]](#)

For information on toner and inkjet cartridge recycling programs from OEM suppliers of new cartridges, contact the manufacturer of your office machine (laser printer, inkjet printer, copier, etc.). Several larger companies offer this type of program.

### **SOURCE REDUCTION**

Source reduction is at the top of the waste management hierarchy. It includes remanufacture and reuse of products. Source reduction activities reduce the amount or toxicity of wastes before they enter the municipal solid waste management system. The recovery and reuse of toner cartridges diverts millions of cubic feet of material from landfills.

Remanufacturing cartridges decreases the amount of plastic, steel, aluminum, and rubber sent to landfills and burned in incinerators. Additionally, a considerable amount of energy is saved by remanufacturing. For example, approximately three quarts of oil are consumed in the production of a single new toner cartridge. A used cartridge can be remanufactured up to four times, depending on type and condition, thereby compounding the environmental benefits. [\[2\]](#)

**What to look for:** Look for cartridges that meet the requirements set forth in [statute](#).

### **INDOOR AIR QUALITY**

Petroleum-based inks and toners contain solvents that emit volatile organic compounds (VOCs). Even though Material Safety Data Sheets may not list hazardous compounds, studies of toner headspace emissions indicate ethylbenzene, xylenes and styrene are emitted from toners. [3] Paper that is processed through a printer or copy machine can emit a variety of VOCs including carcinogens. These VOCs originate from the ink and are volatilized after being heated in the print process. To avoid potential adverse health effects associated with these emissions, select inks that are not petroleum-based.

**What to look for:** Purchase ink or toner cartridges with agri-based ink such as soy-based inks. This will reduce adverse impacts on indoor air quality due to the volatilization of VOCs that may be present in petroleum-based ink and toner.

## **LAWS AND GUIDELINES**

### **California**

#### **Statute**

##### **Public Contract Code (PCC) section 12156**

This section states that:

Each state agency shall print a statement on the cover of its printer or duplicator cartridge bid packages, or in some other noticeable place in the bid packet, notifying all bidders that it is unlawful to prohibit a printer or duplication cartridge that is sold to the state from being recycled or remanufactured, except as specified in subdivision (b) of California PCC section 12156.

- Except as provided in subdivision (b) of California PCC section 12156, no state agency shall purchase any printer or duplication cartridge for which the manufacturer, wholesaler, distributor, retailer, or remanufacturer places restrictions on the recycling or remanufacturing of that cartridge by any other person, except to enter into signed agreements with customers that consent to the return of the used cartridges to the manufacturer, wholesaler, distributor, retailer, or remanufacturer, only for either of the following purposes:
  - - a. Recycling and remanufacturing, for purposes of making the remanufactured cartridge available for purchase.
    - b. Recycling.

##### **State Agency Buy Recycled Campaign (SABRC)**

- Printer and duplication cartridges fall within the SABRC plastic products (PL) category (see [PCC section 12207](#)).
- Recycled-Content Product Procurement Requirements
  - [PCC sections 12203 and 12209](#) require State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on plastic products be spent on products that meet the content requirements set forth in [PCC section 12209](#). Content requirements specific to printer and toner cartridges are described in [PCC section 12209\(f\)\(2\)](#). To count towards the procurement mandates printer or duplication cartridges shall comply with one of the following:
    - Be a recycled cartridge that has undergone a process of collecting, sorting, cleansing, treating, or reconstituting, and which has been returned for the remanufacture of a used cartridge.
    - Be a remanufactured cartridge that has been restored, renovated, repaired, or recharged, without substantial alteration of its form.
    - Consist of at least 10 percent postconsumer material.
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires State agencies to obtain from printer and duplication cartridge suppliers written certification:



- of the postconsumer content of each cartridge, or
  - that the cartridge complies with the requirements of [PCC section 12156\(e\)](#).
- Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires PL purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

## Federal

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the [Comprehensive Procurement Guidelines](#) (CPG). Toner cartridges are USEPA-designated items. Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable. [4] This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [5],[6] The toner cartridge "RMAN recommends that procuring agencies establish procedures and policies that give priority to remanufacturing the agencies' expended toner cartridges. EPA recommends that, under such policies and procedures, agencies procure remanufacturing services for expended cartridges and, when such services are unavailable or not practicable, obtain remanufactured toner cartridges or new toner cartridges made with recovered materials from product vendors." [7]

Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [8]

## PERFORMANCE

It has been the experience of many users that remanufactured toner and inkjet cartridges will perform as well as, or better than, new cartridges when they are remanufactured by reputable companies exercising good quality control. Cartridge remanufacturing and recycling has improved drastically since it began in the 1980s and early 1990s. At that time, many companies did not properly remanufacture cartridges. Instead, they used what is referred to as the "drill and fill" method to refill cartridges without taking appropriate steps to properly disassemble, refit, clean, and reassemble the cartridge. Many customers who wanted to demonstrate environmental awareness were frustrated by poor product quality and unresponsive customer service from these disreputable companies. Today's practices are far superior. Many companies provide quality products and guarantees.

Some companies have issued further guarantees by assuring that their cartridges will not damage machines. In the event of damage, they cover any repair costs directly attributed to a faulty cartridge.

Within the office machine industry, responses to the growing cartridge remanufacturing industry vary. Some printer manufacturers that also sell cartridges have instituted their own recycling and remanufacturing programs. Others have responded more defensively by instituting warranty restrictions on their products if users do not use OEM cartridges or new cartridges or they have designed cartridges with computer chips that must communicate with the printer to provide full functionality.

Users should be wary of such warranty and technical restrictions. Under federal law, the legality of a manufacturer requiring the purchase of their supplies as a condition of warranty is questionable. Because

each customer-supplier relationship may be interpreted differently in different legal forums, purchasers of printers and copiers should include specifications in the original printer purchase contract that protects the user from such exclusions.

## AVAILABILITY

Remanufactured toner and inkjet cartridges for printers are widely available through certified California [small businesses](#), certified California [disabled veteran business enterprises](#), and the Statewide office supplies contract with [Office Depot](#).

## COST

One of the clearest advantages of using remanufactured toner or inkjet cartridges is cost savings. Remanufactured cartridges commonly cost 30 to 50 percent less than new cartridges. Moreover, they often contain up to 20 percent more toner or ink. [\[9\]](#) Remanufactured cartridges are a good value because product quality and performance can match or exceed that of new cartridges.

Some cartridge remanufacturers will accept used cartridges at no cost, or even buy them back or provide a credit, depending upon the model.

## TIPS ON BUYING TONER AND INKJET CARTRIDGES

- All vendors should have prior successful experience producing remanufactured toner cartridges for at least one (1) year at a rate of at least two hundred (200) cartridges per month. Samples may be required prior to bid award.
- The intent of buyers should be to purchase goods, equipment and services having the least environmental impact within the constraints of statutory purchasing requirements, departmental needs, availability, and sound economic considerations.

## SPECIFICATIONS

### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

### Tips for Writing Specifications

There are several key issues to include in contract specifications and to keep in mind when shopping outside of a contract. Consider these issues related to the vendor's remanufacturing process and product performance.

- How long has the company been in business?
- What kind of references can the company provide?
- Does the company use a true remanufacturing process to disassemble, replace parts, clean, refill with toner, and reassemble cartridges - not just "refill" them? What parts are replaced during the process?
- Are the remanufactured toner cartridges able to perform to specifications equal to, or exceeding original equipment manufacturer's (OEM) cartridge standards of quality and performance and approved remanufactured toner cartridge industry standards? Toner cartridges furnished to this specification should meet or exceed the latest [remanufactured toner cartridge standards](#), or the

guidelines adopted by the Standardized Test Methods Committee (STMC), the American Society for Testing and Materials (ASTM) and the International Safe Transit Association (ISTA), including the ASTM F 1856 Standards, ASTM F 335 and F 2036 Standards and ISTA - Integrity Procedure 1A Standards (ISTA 1A).

- Can the remanufacturer certify that its remanufactured toner cartridges have been tested in accordance with the above standards and guidelines and that its cartridges have met or exceeded those tests?
- Does the company test each cartridge before it is sent out? Will it provide a test page printed from each cartridge, demonstrating that it performs properly?
- What is the length of the warranty coverage? Does the warranty cover any damages to equipment caused by a faulty cartridge?
- Will the company accept the return of used cartridges, and for which models?
- Will it require one-to-one exchange, or accept any number of cartridges? Will it charge to accept used cartridges, accept cartridges at no cost, or provide a credit for each used cartridge accepted?
- If the toner cartridge defect rate exceeds three percent (3%) of all cartridges utilized within any six-month period, will the company accept the return of all unused product for a full refund?

### **Sample Language**

When buying toner and inkjet cartridges, include specifications which require:

- Assessment to determine if the toner cartridge can be remanufactured.
- Complete disassembly of toner cartridge to thoroughly clean and check all internal and external components against the original manufacturer's specifications. Worn, damaged, or end of life-cycle components should be replaced.
- Replacement of the original OEM drum with a new drum (which may include an extended life-drum). If the returned toner cartridge is equipped with an extended-life drum, bidder shall inspect it, clean it, or replace it with a new extended-life drum or new after market drum.
- Replacement of all seals with an OEM-type heat seal, card seal, or pressure sensitive seal.
- Replacement of the primary charge roller (PCR) with a re-coated or new PCR.
- Replacement of wiper blade meeting OEM specifications or the latest remanufactured toner cartridge industry standards adopted by the STMC or the latest guidelines adopted by ASTM for remanufactured toner cartridges.
- Replacement of any parts not meeting OEM specifications or the latest remanufactured toner cartridge industry standards adopted by the STMC or the latest guidelines adopted by ASTM for remanufactured toner cartridges.
- Filling of toner cartridge meeting OEM specifications or the latest remanufactured toner cartridge industry standards adopted by the STMC or the latest guidelines adopted by ASTM for remanufactured toner cartridges.
- Chemically cleaning or replacing the corona wire assembly (where applicable).
- All cartridges are to be tested after remanufacturing by installing the cartridge in an applicable printer, running and inspecting test copies. A copy of a test page is to be included with the finished product.
- All defective toner cartridges will be returned to the vendor at vendor's expense. Vendors should supply pre-paid mailing labels, or should pick up defective cartridge(s) at the buyer's location.
- A diagnostic analysis should be performed to determine the cause of the problem for any toner cartridge returned by the buyer.
- The diagnostic analysis report should be delivered to the buyer within ten (10) business days.
- If the analysis determines that the toner cartridge failed, a replacement remanufactured cartridge should be provided at no expense to the buyer within ten (10) business days from completion of analysis.

- The vendors should warrant the remanufactured toner cartridges against defects in material and workmanship for a minimum of one year from the date of manufacture.
- Vendors should provide in-person or third party collection of all used and empty toner cartridges.
- Vendor should recycle end-of-life toner cartridges and provide buyer with details of its recycling program upon request.
- The vendors should ensure that remaining toner in used cartridges, and all cartridges, casings, and parts not remanufactured or used to create a remanufactured cartridge, are recycled or disposed of in a manner that complies with all environmental and human health and safety laws and regulations.
- At buyer's request, vendors should provide manifests and any other documentation needed to confirm the proper disposal of material.

#### **Other Specifications**

- **King County, Washington**
- **United States Environmental Protection Agency (USEPA), [Database of Environmental Information for Products and Services](#)**. This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services.
  - If you have a specification for an environmentally preferable product or service, consider asking the [USEPA](#) to include it in this database.

## **VENDORS**

#### **Statewide Contract, Small Businesses and Disabled Veteran Business Enterprises**

Remanufactured toner and inkjet cartridges are available through the mandatory Statewide strategically sourced office supplies contract with Office Depot, Inc. (Contract #1S-06-75-55). The use of this contract is mandatory for all State departments except when they purchase from a [certified California Small Business \(SB\) or a certified California Disabled Veteran Business Enterprise \(DVB\)](#).

**NOTE:** Some products are available from certified California SBs and DVBEs through the Statewide strategically sourced office supplies contract with Office Depot, Inc.

[Local agencies](#) may use State procurement contracts.

#### **Other Sources**

##### **Recycled-Content Product Directory**

The California Integrated Waste Management Board's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

## **SUCCESS STORIES**

#### **State of California**

The California Integrated Waste Management Board fact sheet titled "[Have You Gotten Recharged Lately?](#)" describes the benefits of recycling your used computer printer ink/toner cartridges, and it includes testimonials from State agencies on their experience using recharged printer ink/toner cartridges.

#### **Ventura County, California**

The County of Ventura spent \$524,000 on laser and toner cartridges in 2004. Buying remanufactured cartridges saved the county a considerable amount of money in these budget conscious times.

Remanufactured cartridges generally cost Ventura County about 20 percent to 50 percent less than OEM cartridges. [\[10\]](#)

### **State of Wisconsin**

Since 1990, Wisconsin has been a leader in the development of recycled product specifications, and has led several regional state cooperative procurements by working with the Council of Great Lakes Governors. State agencies buy recharged toner cartridges in addition to other recycled products. Wisconsin has considered the potential of every type of recycled product for state procurement. Even in those cases where the purchase was not pursued, they have communicated their concerns to vendors and industry in the hopes of improving price, performance, competition, or availability. [\[11\]](#)

## **RESOURCES AND WEBSITES**

### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the CIWMB's [Ink and Toner Cartridges Web page](#) for information on cartridges.

### **King County Environmental Purchasing Program**

Seattle, WA  
(206) 296-0100  
(800) 325-6165

A pioneer and contemporary model in environmental procurement, King County provides sample contract [specifications for toner cartridges](#) and information on a variety of other products. In addition, its Web site contains procurement case studies along with resources for environmental purchasing and waste reduction.

### **Solid Waste Management Coordinating Board (SWMCB) of Minnesota**

The SWMCB's [Environmentally Preferable Purchasing Guide](#) provides assistance on the purchase of numerous environmentally preferable products, including remanufactured [toner and inkjet cartridges](#).

### **United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a wide range of information about products such as toner cartridges. Visit the USEPA's [Comprehensive Procurement Guidelines](#) (CPG) Web site for Recovered Materials Advisory Notices (RMAN), which recommend recycled-content levels. The site includes a [toner cartridges page](#), a downloadable [nonpaper office products fact sheet](#) for 2007, and a [CPG Supplier Database](#). The USEPA also maintains a [Database of Environmental Information for Products and Services](#) that contains local, state, and federal contract and policy specifications, product environmental performance standards/guidelines, lists of products identified as "green" by other organizations, and links to additional useful environmental information on products and/or services.

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[1] Alameda County Waste Management Authority, Alameda County Source Reduction and Recycling Board. Remanufactured Toner Cartridges in Alameda County Fact Sheet. Last updated in May 2004. Available at [www.stopwaste.org/docs/toner.pdf](http://www.stopwaste.org/docs/toner.pdf).

[2] INFORM Fact Sheets & Summaries, Waste Prevention, Community Waste Prevention Toolkit, Toner Cartridge [Fact Sheet](#)

- [3] Wolkoff, P., Wilkins, C.K., Clausen, P.A., and Larsen, K. Comparison of Volatile Organic Compounds from Processed Paper and Toners. 1993.
- [4] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Nonpaper Office Products [Fact Sheet](#).
- [5] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.
- [6] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Nonpaper Office Products [Fact Sheet](#).
- [7] United States Environmental Protection Agency. Comprehensive Procurement [Guidelines Toner Cartridges](#) Web page.
- [8] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Nonpaper Office Products [Fact Sheet](#).
- [9] Solid Waste Management Coordinating Board of Minnesota. [Environmentally Preferable Purchasing Guide](#), Toner and Inkjet Cartridges
- [10] Ventura County, Environmental & Energy Resources Division. [Remanufactured Cartridges](#) Web page.
- [11] State of Wisconsin, Bureau of Procurement, VendorNetSystem. Recycling Procurement Program Web Page. Available at [vendornet.state.wi.us/vendornet/recycle/index.asp](http://vendornet.state.wi.us/vendornet/recycle/index.asp).

## Office Supplies

### Environmental and Health Issues and Recommendations



#### Prevents Waste:

Preventing waste can conserve natural resources and save landfill space. You prevent waste when you:

- Reduce the amount of material you buy to accomplish any task;
- Reuse a product; or
- Use repairable, refillable, or more durable products.



#### Recycled Content:

Many office supplies, especially those made from paper, metal, or plastic are available with recycled content. Look for products that contain postconsumer material, which is finished material that has completed its life cycle as a consumer item, and would have been disposed of as a solid waste, but is instead diverted from landfill disposal and recycled or reused. Purchasing recycled-content products that are made with postconsumer material directly supports the recycling programs of local jurisdictions.

Compared to manufacturing with virgin materials, making products with recycled materials typically requires less energy; emits lower levels of climate-changing gases; and produces less pollution. [\[1\]](#)



#### Less Hazardous:

Buying paper that is bleached without chlorine or chlorine compounds reduces pollution. [\[2\]](#)





### **Indoor Air Quality (IAQ):**

Look for products that emit zero or low amounts of volatile organic compounds (VOC). VOCs often have an odor, and sources of VOCs include correction fluids, carbonless copy paper, adhesives, and permanent markers. Low-VOC versions of many of these products are readily available. [\[3\]](#)

- [Needs Assessment](#)
- [What environmentally preferable office supplies are available?](#)
- [Purchasing Resources](#)
- [What are the benefits of using the Statewide office supplies contract?](#)
- [How can I buy products from the Statewide office supplies contract?](#)

## **NEEDS ASSESSMENT**

Before you purchase a product, consider the task that you wish to accomplish with the product. Do you really need to make a purchase? Have you looked for [used supplies](#) in your office? Can the task be accomplished in a less expensive and less resource-intensive manner? For example, documents can be emailed and made available via Web sites, thus eliminating associated costs of envelopes, paper, and postage.

When you purchase [new supplies](#), look for those with environmentally preferable attributes.

## **WHAT ENVIRONMENTALLY PREFERABLE OFFICE SUPPLIES ARE AVAILABLE?**

### **Used Supplies**

Many office supplies such as folders, desk accessories, envelopes, packaging material, mailing supplies, archive boxes, binders, floppy disks, etc. can be reused. Consider creating an office supplies reuse center, and remember to advertise its existence. It can be as small as a cabinet or as large as a storage room. The California Integrated Waste Management Board provides [tips](#) and [posters](#) (See the Office Trading Post poster and others.) related to reuse in the office.

### **New Supplies**

Some of these environmental attributes may be found in environmentally preferable products, depending on the product:

- Durability
- Recycled content
- Low or zero air emissions and hazardous substances
- Water efficiency
- Easy, non-hazardous maintenance
- End-of-life management that keeps materials out of landfills (e.g., reuse, recycling, return to manufacturers)
- Energy efficiency
- Low life cycle cost

California State agencies should look for products that meet or exceed the minimum recycled content requirements of the [State Agency Buy Recycled Campaign \(SABRC\)](#), and should ask their suppliers to provide purchase reports that provide the information needed for SABRC tracking and reporting.

A wide variety of new environmentally preferable office supplies are available, including:

- Archive boxes - postconsumer recycled content

- Binders - postconsumer recycled content
- Bubble wrap - postconsumer recycled content
- Calculators - solar powered
- Calendars - postconsumer recycled content
- Clipboards - postconsumer recycled content
- Compact disk cases - new disks in reused cases
- Continuous feed computer paper - postconsumer recycled content
- Copier paper - postconsumer recycled content; processed chlorine free; alternative fiber
- Correction fluid - low odor; water-based
- Daily planners - postconsumer recycled content
- Desk accessories - postconsumer recycled content
- Envelopes and mailers - postconsumer recycled content
- File folders - postconsumer recycled content
- Floppy disks - reformatted for reuse
- Glue sticks - low or no odor
- Hanging folders - postconsumer recycled content
- Highlighters - low or no odor
- Index cards - postconsumer recycled content
- Mailing tubes - postconsumer recycled content
- Markers - low or no odor
- Message pads/books - postconsumer recycled content
- Notebooks/pads - postconsumer recycled content
- Paper clips - postconsumer recycled content
- Pencils - refillable; recycled content
- Pens - refillable
- Portfolios - postconsumer recycled content
- Repositionable notes - postconsumer recycled content
- Ruled paper - postconsumer recycled content
- Rulers - postconsumer recycled content
- Scissors - postconsumer recycled content
- Sheet protectors - recycled content
- Stationery - postconsumer recycled content; processed chlorine free; alternative fiber
- Toner and inkjet cartridges - remanufactured
- Transparency film - recycled content

## **PURCHASING RESOURCES**

### **Statewide Contract, Small Businesses and Disabled Veteran Business Enterprises**

Numerous environmentally preferable office supplies are available through the mandatory Statewide office supplies contract with Office Depot, Inc. (Contract #1S-06-75-55). The use of this contract is mandatory for all State departments except when they purchase from a certified California Small Business (SB) or certified California Disabled Veteran Business Enterprise (DVBE) or in cases of emergency.

### **Other**

#### ***California Integrated Waste Management Board (CIWMB)***

The CIWMB's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

#### ***United States Environmental Protection Agency (USEPA)***

The USEPA's [Comprehensive Procurement Guidelines \(CPG\) Supplier Database](#) is a searchable database of vendors who sell or distribute CPG-designated products with recycled content. The USEPA also maintains a [Database of Environmental Information for Products and Services](#).

#### WHAT ARE THE BENEFITS OF USING THE STATEWIDE OFFICE SUPPLIES CONTRACT?

The Statewide office supplies contract with Office Depot, Inc. (Contract #1S-06-75-55) offers streamlined and efficient methods of acquiring office supplies at substantial savings.

#### HOW CAN I BUY PRODUCTS FROM THE STATEWIDE OFFICE SUPPLIES CONTRACT?

Detailed contract user instructions are available on the Department of General Services Procurement Division's Web site.

[Local agencies](#) may use State procurement contracts.

[1] United States Environmental Protection Agency. *Frequently Asked Questions about Recycling and Waste Management*. Available at: <http://www.epa.gov/epaoswer/non-hw/muncpl/faq.htm>.

[2] Conservatree. *Environmentally Sound Paper Overview: Essential Issues. Part III - Making Paper: Content*. Available at: <http://www.conservatree.org/learn/Essential%20Issues/EIPaperContent.shtml> (See "Bleaching" section.)

[3] United States Environmental Protection Agency. *Indoor Air Quality, Sources of Indoor Air Pollution - Organic Gases (Volatile Organic Compounds - VOCs)*. Available at: <http://www.epa.gov/iaq/voc.html>.

## Outdoor Furnishings (OF)

- [Recycled Plastic Lumber](#)
- [Treated Wood](#)

## OF – Recycled Plastic Lumber

### Environmental and Health Issues and Recommendations



#### [Recycled Content:](#)

Plastic lumber is generally manufactured from 25 percent to 100 percent by weight preconsumer and postconsumer plastics, or a blend of recycled plastic with other materials such as wood fiber, glass fiber, rice hulls, peanut shells, and rubber.

- Purchase plastic lumber with at least 10 percent by weight postconsumer plastic. Higher postconsumer plastic content is recommended.



#### **Material Availability:**

By using materials that have been diverted from the waste stream (e.g. plastic, wood, rubber, etc.), recycled plastic lumber (RPL) conserves landfill space. As a substitute for other materials, such as wood, concrete, and metals, RPL helps to reduce the consumption of our natural resources, thereby reducing the impacts that resource extraction can have on human health and the environment.



#### [Less Hazardous:](#)

Although RPL contains chemical additives, they are not released into the soil or water. For this reason, RPL is offered as an alternative to treated wood, which has been blamed for leaching hazardous materials, such as arsenic.



#### **End-of-Life Management:**

Currently, there is no collection infrastructure for RPL in California since this is a relatively new durable material. Manufacturers offering take back programs should be preferred.



#### **Waste/Materials Management:**

Plastics represent 9.5 percent by weight, or 3,809,699 tons, of the total solid waste disposed in California. [1] Almost half of them are film plastic, which is one of the main feedstocks used in the manufacture of RPL. As we strive to be a [zero waste](#) state, we must manage this waste by first preventing waste whenever possible and managing all "waste" materials to their highest and best use.

Effective plastics management keeps them out of landfills and prevents the impacts associated with the extraction of oil.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
  - [Less Hazardous](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Tips on Buying RPL](#)
- [Specifications](#)
- [Vendors and Manufacturers](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

Recycled plastic lumber (RPL) comes in different varieties depending on the types of materials used. RPL, for instance, could be made of pre or postconsumer high density polyethylene (HDPE), polystyrene (PS), polypropylene (PP), and mixed plastics. However, most RPL is made entirely of HDPE, the material used in milk jugs and liquid laundry product bottles. Postconsumer plastic film is another good source of RPL. The plastic component can also be blended with additional materials to form a stronger product called composite plastic lumber. Some of the materials used in the composite product include natural and synthetic fibers (e.g. rice hulls, sugar cane, wood, and glass), rubber, minerals, and metals.

RPL was used initially in applications that do not require critical load-bearing such as picnic tables, park benches, partitions, trash receptacle covers, dimensional lumber, and landscape timbers. RPL picnic tables and park benches are considered worthwhile, but the demand is just not great enough to divert any significant amount of plastics from landfills. [2]

RPL used in outdoor structural applications such as decks, boardwalks, railroad ties, and docks, instead, promises to capture a greater portion of the market, and will use huge portions of plastic waste. The United States (U.S.) railroad industry, for example, replaces approximately 14 million wooden ties a year out of the nearly 700 million ties used annually. It is estimated that the replacement and installation of new wooden ties costs the railroad industry over a billion dollars a year. RPL ties could be used as an alternative to wooden ties. Each RPL railroad tie requires 200 pounds of plastic - equaling 1,200 bottles. [\[3\]](#)

The use of RPL as a substitute for pressure treated lumber is another attractive market, considering that in the U.S. alone, the market for pressure treated lumber is estimated at about \$10 billion (\$4 billion for decks in houses). [\[4\]](#) However, the leader in sales volumes for RPL (35 - 55 percent of the market) is commercial and residential decking. The agreement between the United States Environmental Protection Agency (USEPA) and the U.S. lumber industry to phase out arsenic compounds from pressure treated wood is helping to support the growing market of RPL in decking applications. The park and recreation market, with 20 percent to 30 percent of the market, is no longer the largest market for RPL. Railroad ties represent only 7 percent to 15 percent of the RPL market. [\[5\]](#)

## **Environmental and Health Issues**

### **RECYCLED-CONTENT**

Environmental and health benefits also make RPL a good choice. The manufacture of RPL from postconsumer and postindustrial resins is promising as it consumes large amounts of material that would otherwise be sent to landfills or become litter. Even small quantities of RPL can remove large amounts of plastic from the waste stream. More than 750 recycled milk jugs and detergent bottles, for example, are used to make a single four-foot long plastic bench. [\[6\]](#)

### **LESS HAZARDOUS**

RPL is an alternative to treated wood, which has been blamed for leaching hazardous materials, such as arsenic. Although RPL uses several chemical additives such as antioxidants, biocides, heat and light stabilizers, lubricants, and flame retardants, they do not leach into the water or the soil because they are encapsulated in the plastic matrix.

## **LAWS AND GUIDELINES**

### **California**

#### **Statute**

#### **State Agency Buy Recycled Campaign (SABRC)**

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on plastic products be spent on plastic products with at least 10 percent postconsumer recycled content [exception: see content requirements for printer and duplication cartridges in [PCC 12209\(f\)\(2\)](#)].
  - The SABRC plastic products (PL) category includes, but is not limited to, printer or duplication cartridges, diskettes, carpet, office products, plastic lumber, buckets, wastebaskets, containers, benches, tables, fencing, clothing, mats, packaging, signs, posts, binders, sheet, building products, garden hose, and trays (see [PCC section 12207](#)).

- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires PL purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

### **Regulation**

The California State Fire Marshall's (SMF) Office has developed building codes for areas within the [Wildland-Urban Interface Fire Area](#) as defined in Title 24, California Code of Regulations (CCR), section 702A. 24 CCR 704A.4 states that "decking, surfaces, stair treads, risers, and landings of decks, porches, and balconies" or any portion of located within 10 feet of the primary structure will need to meet the testing requirements established. Decking material not heavy timber or treated with fire retardant would need to pass the performance requirements of SMF 12-7A-4 parts A and B. These requirements test the decking material to ensure that flames will not spread as a result of specific contact. The aforementioned regulations were approved on September 21, 2005 and are available on the [SMF's Web site](#).

### **Federal**

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the USEPA in the [Comprehensive Procurement Guidelines](#) (CPG). A number of RPL products are USEPA-designated items. Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable. [7] This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [8],[9] The [USEPA's recommended recovered materials content levels](#) for RPL products are available on-line.

Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [10]

### **PERFORMANCE**

The performance of plastic lumber depends on the type and amount of materials used and the process applied to them. The addition of wood fiber to single virgin polymers such as polypropylene (PP) and polystyrene (PS) produces a plastic composite lumber with aesthetic and mechanical properties (strength and stiffness) equal and even superior to wood lumber. [11] However, the cost of such products is higher than RPL and they consume nonrenewable resources. Increasing the amount of fiber in the composite plastic lumber improves the resistance to deformation of the product. When commingled plastics containing impurities are used, the resulting RPL does not have a homogeneous density. This may also happen to virgin materials.

Although RPL can be used in place of wood in many applications, it has different physical and mechanical properties. Time and temperature determine the properties of RPL. In general, RPL has a much lower stiffness than wood and is more prompt to deformation under sustained loads. Also the dimensional changes due to temperature are greater in RPL than in wood. Wood also experiences dimensional



instability, but it is due to releasing or uptaking of water. Despite all these differences, RPL offers certain advantages over wood products. Some of these positive characteristics of RPL include:

- Rarely cracks or splinters.
- Resists rot, mildew and termites.
- Is weather and graffiti-resistant.
- Is unaffected by bacteria, worms, insects, fungi or rodents.
- Can be painted or stained when wood or other natural fiber is incorporated.
- Provides good shock-absorbing surface for pedestrian traffic.
- No waterproofing, staining or regular maintenance required.
- Is long lasting, sometimes lasting more than 50 years, depending on the application.
- Is sold in a variety of standard dimensional sizes, colors and textures.
- Is aesthetically pleasing. Can be manufactured to meet different designs and appearance specifications.

Knowledge of the mechanical properties of RPL is particularly important in construction applications. However, the lack of performance standards represented a barrier to increase the commercialization and applications of RPL. Fortunately, in 1993 the American Society for Testing and Materials (ASTM), [Subcommittee D20.20.01](#) on Manufactured Recycled Plastic Lumber, was formed to develop test methods and specifications for plastic lumber materials. [\[12\]](#) Below is the list of current and proposed ASTM standards for plastic lumber:

ASTM Plastic Lumber Test Methods:

- D6108-97 Compressive Properties
- D6109-97 Flexural Properties
- D6111-97 Bulk Density and Specific Gravity
- D6112-97 Compressive and Flexural Creep
- D6117-97 Mechanical Fasteners
- D6341-98 Coefficient of Thermal Expansion
- D6435-99 Shear of Boards and Shapes
- E108 Residential Decking Flammability

ASTM Standards in Development:

- X-20-18 Polyolefin Plastic Lumber Deck Boards
- X20-28 Guide for Testing Plastic Lumber
- X20-39 Guide: Plastic Lumber Deck Construction
- X20-43 Specifications for Plastic Lumber Joists
- X20-44 Specifications for PVC Decking
- X20-41a Flexural Properties of Polymeric Piles
- X20-48 Radial Compression of Polymeric Piles
- X20-49 Specifications for Plastic Lumber in Bulk Head systems
- X20-51a Specifications Polymeric Piles for Marine Fendering
- X-XX-XX-99 Standard Specification for Marine Load-Bearing Polymeric Piles

**Note:** When plastic lumber is used in decking applications, the floor joists must be closer together to compensate for deformation.

## AVAILABILITY

There are about 32 manufacturers of plastic wood or lumber made from recycled plastic in North America. Unfortunately very few are located in California, but many of the manufacturers have sales representatives in California. See also the [Vendors and Manufacturers](#) section below.

## COST

Although the initial cost to purchase recycled plastic lumber products averages 20 percent to 50 percent more than the price of wood, payback is typically in two to four years when factoring in reduced maintenance and replacement costs. Some manufacturers assert that reducing those costs makes plastic lumber ultimately less costly than even the least expensive natural wood on the market. Many manufacturers offer free replacement for planks that crack or splinter, and guarantee their product to last up to 50 years. [\[13\]](#) While purchase prices of RPL are expected to decrease as technology improves and demand increases, wood prices are expected to continue to increase.

### TIPS ON BUYING RPL

- Vendors typically provide installation instructions that address differences in working with plastic lumber. Purchasers are encouraged to research their options to select the product that best meets their needs. [\[14\]](#)
- 100 percent recycled content plastic lumber may not perform well in lengths greater than 6 feet or where deflection and creep are critical (e.g. fencing, decking, and bollards). For such uses, consider plastic lumber with fiber such as cellulose or glass. The fiber improves stability and resistance to screw pullout. [\[15\]](#)
- [ASTM Committee D20](#) recommends testing the material in its original, as-manufactured state (at least, relative to the original cross-section).
- It is important to select metal-based pigments for long-term color stability. The organic pigments appear to be less stable during long-term exposure to the sun. [\[16\]](#)
- Request RPL that uses sodium bicarbonate and citric acid as foaming agents. The most commonly used foaming agent is azodicarbomide; however, its toxicity data has not been evaluated.
- Evaluate the toxicity of chemical additives such as flame retardants, coupling agents, metallic pigments, ultraviolet stabilizers, extrusion aids, and foaming agents.

### SPECIFICATIONS

Product specifications for RPL are preferred over method or material specifications because product specifications are based on performance characteristics. Method and material specifications sometimes limit the use of recycled-content products by disqualifying recycled feedstocks or recycling-based technologies and processes.

#### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services (DGS) develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#). Following is a sample of DGS specifications (received October 2005) for RPL:

RECYLED PLASTIC LUMBER (Bid Line Items 1, 2, and 3)

#### Application:

Recycled plastic lumber shall be suitable to be used for fencing and landscaping applications at various facilities of the Department of Parks and Recreation.

#### Requirements:

Material:

**Material composition:**

Composite polyethylene plastic (containing a minimum of 70 percent recycled polyethylene from various sources such as detergent, soda, shampoo and milk bottles) with reinforcing agents.

<b>Material Properties:</b>	<b>ASTM</b>	<b>Test results (material)</b>
Tensile strength	D-198	1,380PSI (2")
Flexural strength	D-790-92	1320 - 2315 (2" - 3")
Compressive strength	D-6108	2670PSI (2")

Note: Test reports in accordance with ASTMs must be available upon request by the state.

Size: Sizes shall be as indicated against the bid line items 1, 2 and 3. A tolerance limit of ¼" shall apply to all dimensions.

Finish: Woodlike grain and structure.

Color: Brown

ADA requirement: Meets Americans with Disabilities Act (ADA) requirements (e.g. slip resistant).

Other features: Maintenance free (no paint, stain, or sealant to be required), color fast (UV stabilized), no chipping or peeling, Hygienic (resistant to all insects, bacteria, cleans easily), no splinters, non-toxic, no special tools required to saw, drill, nail, or mill.

Warranty: 25 year warranty.

**PICNIC TABLE, WHEELCHAIR ACCESSIBLE (Bid Line Item 4)**

**Application:**

Wheelchair accessible picnic table shall be made entirely from recycled composite plastic material as specified above using nuts and bolts (screws/nails not acceptable) and shall be suitable to be used for eating, games and other applications at various facilities of the Department of Parks and Recreation.

**Requirements:**

Material: Same as for the above line items.

Finish: Same as for the above line items.

Color: Same as for the above line items.

Other features: Same as for the above line items.

Warranty: Same as for the above line items.

ADA requirement: Wheelchair accessible.

Size: In accordance with the attached drawing.

**ASTM Specifications**

Besides developing standards for plastic lumber, ASTM Committee D20 also developed purchasing and distribution specifications for RPL based on end use application and performance. The Committee developed the first specification on polyolefin-based plastic lumber decking (ASTM D6662) because this was one of the most promising markets. Manufacturers can now use an "ASTM stamp" on plastic lumber decking boards that meet the specifications. [17] During the development of ASTM D6662, several important issues concerning the performance of RPL in decking boards were resolved. The most important issues addressed in ASTM D6662 include dimensional tolerances, deflection, flammability, material properties for structural design, outdoor exposure, and slip resistance.

**Commonwealth of Massachusetts**

The Commonwealth of Massachusetts developed one of the most comprehensive specifications for plastic lumber. These specifications include definitions, selection criteria, bidder requirements, and products specifications by plastic lumber category, among others. All this information is part of [Appendix](#)

[G.1 of the Environmentally Preferable Purchasing Guide](#) published by the Solid Waste Management Coordinating Board of Minnesota.

### **United States Environmental Protection Agency (USEPA)**

USEPA Comprehensive Procurement Guidelines (CPG) 2002 recommend 25-100 percent postconsumer content for HDPE plastic lumber, 50 percent for mixed plastics/cellulose, 75 percent for HDPE/fiberglass, and 50-100 percent for other resins. In addition, the USEPA's [Database of Environmental Information for Products and Services](#) contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services.

### **Tips for Writing Specifications**

- Use a consistent style, meaning and standard conventions for terms, abbreviations, and units.
- Avoid acronyms.
- Survey the market place to become familiar with available products and features.
- Define features quantitatively in terms of tolerances, ranges, thresholds, and limits.
- Use enforcement words "shall, must, minimum, maximum, less than, no more than, and shall not exceed" to describe required limits.
- Never over specify.
- Take into account life cycle costs of products, such as savings on maintenance, replacement, and disposal costs, which are not factored into the initial unit price.  
**Example:** Your evaluation criteria for bids offering plastic benches and tables could include price, durability, manufacturer warranty, required maintenance, recycled content, testing of product samples, and references.
- Write very tight specifications to control the number of voids in the lumber so that a homogenous product is obtained. RPL manufacturers can prevent the formation of voids by sorting and cleaning raw materials before extruding and forming. The California Department of Transportation (Caltrans), Office of Structure Specifications, developed specifications for plastic lumber in certain structural applications. Additional information is available on [Caltrans' Web site](#).

## **VENDORS AND MANUFACTURERS**

### **State Contracts**

RPL products are available through [California Multiple Award Schedules](#) (CMAS) contracts.

### **Other Sources**

#### **Comprehensive Procurement Guidelines**

The USEPA's list of designated products and the accompanying recycled-content recommendations provides recycled-content product information and two sources of vendors. One source is the [Database of Manufacturers and Suppliers](#) that identifies manufacturers and suppliers of plastic lumber containing recycled plastic. The second source is the [GSA \(General Services Administration\) Advantage](#) that lists products available through the Federal Supply Service. The GSA Advantage includes RPL.

#### **The Environmentally Preferable Purchasing Guide**

The Solid Waste Management Coordinating Board of Minnesota developed this Guide as a reference tool for government and school purchasers who want to buy more wisely. [Section 8.1 lists known North American manufacturers](#) and distributors of recycled-content plastic lumber that meet the federal procurement guidelines.

### **Open Directory Project**

Visit the [Open Directory Project Web site](#) for a complete list of plastic lumber manufacturers in North America.

### **Recycled-Content Product Directory**

The California Integrated Waste Management Board's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

## **SUCCESS STORIES**

### **Kern County, California**

In 1995, the Kern County Waste Management Department and Kern County Fair Board worked out a five-year agreement that allowed for the construction of a 2,000 square-foot fountain pavilion. Inside the pavilion, benches and picnic tables made from polystyrene lumber and recycled aluminum seat up to 100 people. Brass plates mounted on each bench and picnic table explain just how many milk jugs, plastic cups and aluminum cans went into the making of each product. [\[18\]](#)

### **King County (Washington) Environmental Purchasing Program**

In 1994, the Parks Division of the King County Environmental Purchasing Program acquired 41 boards made of 100 percent postconsumer HDPE. The plastic lumber was used to replace treated wood bench slats to combat weather and vandalism. Initially it was considered an expensive project, but cost savings came from lower maintenance. It took more time to cut the plastic lumber into six-foot lengths than wood, but the installation time was the same as for wood. The Parks Division representative said he would purchase this product again because it is visually pleasing and is very versatile. Additional information about this project can be found on the [King County Environmental Purchasing Web site](#).

### **Demonstration Projects**

To demonstrate successful uses of RPL in structural applications and to obtain data to be used in the development of standards, five demonstration projects were undertaken:

- Decking boards in a boardwalk at Kelleys Island on Lake Erie, Ohio;
- Bridge at Fort Leonard Wood, Missouri;
- Floating docks for the Op Sail 2000 event in New York, New York;
- Elevated platforms at the bobsled and luge track, Lake Placid, New York; and
- An arched truss bridge near Albany, New York.

Information about these projects is available on the [ASTM's Web site](#).

### **City of Seattle, Washington [\[19\]](#)**

In 1996, the City of Seattle built a recycled plastic pedestrian bridge across a stormwater retention pond. They decided to use RPL because Thorton Creek was being rehabilitated as a salmon stream.

At the time, plastic lumber was very new to the marketplace, not widely available, and did not have a long usage history. The design team had to make adjustments to their original wood design because plastic is a very different material than wood. Three different types of plastic lumber were sourced for this project:

- Recycled plastic 8"x8"s, reinforced with four steel bars (re-bar), were used for pilings and support members. The cost was approximately 1.5 times the cost of treated lumber.
- Fiberglass reinforced recycled plastic 2"x8"s were used for the joists, at a cost of about 2.7 times that of treated lumber.

- Recycled plastic/wood composite 2"x6"s were used for decking at a cost of about twice that of treated lumber.

This is probably the largest project that the City has done using RPL, but they have done several plastic lumber decking projects, park rainbow signs, truck sideboards and more.

## RESOURCES AND WEBSITES

### [American Society for Testing Materials \(ASTM\)](#)

West Conshohocken, PA  
(610) 832-9585

ASTM International is a non-profit organization for the development and publication of voluntary consensus standards for materials, products, systems, and services. A [December 2001 article from the ASTM Standardization News](#) examines how standards have contributed to the growth of the recycled plastic lumber products industry.

### [California Integrated Waste Management Board \(CIWMB\)](#)

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. The CIWMB is actively working toward developing more comprehensive solutions for managing plastic materials, and to mitigate for the adverse environmental impacts associated with plastic discards. For more information, visit the CIWMB's [Plastics Information and Resources Home Page](#).

### [King County Environmental Purchasing Program](#)

Seattle, WA  
(206) 296-0100  
(800) 325-6165

A pioneer and contemporary model in environmental procurement, King County offers on its Web site procurement case studies for a variety of products including recycled plastic lumber, along with resources for environmental purchasing and waste reduction. The December 2003 report, "Plastic 'Lumber' and Other Recycled Plastic Products", discusses the county's experiences with procurement, bid and contract specifications. The county maintains an extensive vendor list.

### [Minnesota Pollution Control Agency \(MPCA\)](#)

St Paul, MN  
(651) 296-6300  
(800) 657-3864

The MPCA is a state agency that provides information, assistance, grants, and loans in the areas of waste, pollution prevention, recycling, reuse, and environmental education. The MPCA's Web site houses many resources on recycled [plastic lumber](#), including a vendor list, success stories, detailed product characteristics, and information about the ASTM standards.

### [National Recycling Coalition's Buy Recycled Business Alliance \(BRBA\)](#)

Washington, DC  
(202) 789-1430

The BRBA is a broad-based group of companies and nonprofit organizations committed to increasing the purchase of recycled-content products.

### [Plastic Lumber Trade Association](#)

Akron, OH  
(330) 762-1963



The Plastic Lumber Trade Association promotes the engineering, art and science, marketing and procurement of recycled plastic lumber and related products. The association's Web site contains downloadable annual reports on the "[State of Recycled Plastic Lumber](#)".

### **Recycled Plastic Products Directory**

Arlington, VA  
(800) 2-HELP-90

The American Plastics Council, a trade association for plastics manufacturers, maintains a Web site containing information on recycled-content plastic products such as lumber and decking, as well as information on recycling plastics. The council's national vendor database lists over 30 manufacturers of plastic lumber and specifies the level of postconsumer content in their products.

### **Residential Environmental Design**

Residential Environmental Design, a Web site supporting the advancement of green architecture, offers reviews of vendors of recycled-content decking.

### **United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of public information about products such as recycled plastic landscaping timbers and posts. Visit the USEPA's [Comprehensive Procurement Guidelines](#) (CPG) Web site for its Recycled Material Advisory Notices (RMAN), which recommend recycled-content levels. Since 2004, the USEPA has offered downloadable fact sheets for that summarize CPG information, USEPA's recovered materials content recommendations, case studies from around the country, and key resources, associations, and Web sites.

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[1] State of California. California Integrated Waste Management Board. 2003 California Waste Characterization Study. Available at <http://www.calrecycle.ca.gov/Plastics/>.

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[3] The American Plastics Council. Recycled Plastic Lumber.

[4] Ibid.

[5] The Plastic Lumber Industry in Competitive Markets. 2001-2002 State of the Recycled Plastic Lumber Industry. Presented by Alan E. Robbins. Annual Meeting of the Plastic Lumber Trade Association. March 11, 2002, Pittsburg, Pennsylvania.

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[7] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Park & Recreation Products Fact Sheet. Available at [www.epa.gov/cpg/factshts.htm](http://www.epa.gov/cpg/factshts.htm).

[8] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.

[9] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Park & Recreation Products Fact Sheet. Available at: [www.epa.gov/cpg/factshts.htm](http://www.epa.gov/cpg/factshts.htm).

[10] Ibid.

[11] Environment and Plastics Industry Council (EPIC). Recycled Plastic Lumber. A Strategic Assessment of its Production, Use and Future Prospects. Report prepared by David Climenhage, under contract, for the Environment and Plastics Industry Council. January 2003, p.2.

- [12] Prabhat Krishnaswamy and Richard Lampo. "Recycled-Plastic Lumber Standards: from Waste Plastics to Markets for Plastic-Lumber Bridges." ASTM Standardization News. December 2001. Available at [www.astm.org/SNEWS/DECEMBER\\_2001/wsd\\_dec01.html](http://www.astm.org/SNEWS/DECEMBER_2001/wsd_dec01.html).
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- [19] King County (WA) Environmental Purchasing Program. Plastic "Lumber" and other Recycled Plastic Products. Recycled Plastic Pedestrian Bridge, City of Seattle. Available at [http://www.kingcounty.gov/operations/procurement/Services/Environmental\\_Purchasing.aspx](http://www.kingcounty.gov/operations/procurement/Services/Environmental_Purchasing.aspx).

## OF – Treated Wood

### Environmental and Health Issues and Recommendations



#### Less Hazardous:

Wood treated with Chromated Copper Arsenate (CCA), a restricted-use pesticide, contains arsenic, a carcinogen that poses safety concerns to those who work with it.

- Alternatives such as non-wood materials (see [Recycled Plastic Lumber](#) section), naturally decay-resistant wood, and wood treatments like Ammoniacal Copper Quaternary, [\[1\]](#) Copper Azole [\[2\]](#) and sodium silicates [\[3\]](#) are safer to use.



#### [End-of-Life Management:](#)

Treated wood waste is subject to California's Hazardous Waste Control Law and must be managed accordingly.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Alternative Materials](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability and Vendors](#)
- [Cost](#)
- [Specifications](#)
- [Resources and Web Sites](#)

- [End-of-Life Management](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Treated wood contains chemical preservatives to protect it from water damage, fungal decay, and insect infestation. A cause for concern, however, is that one of the most common preservatives contains high levels of arsenic - a known carcinogen. This is the popular preservative Chromated Copper Arsenate (CCA). Arsenic also appears in several other preservatives, such as Ammoniacal Copper Arsenate and Ammoniacal Copper Zinc Arsenate, but CCA is the most widely used.

After twenty years of heavy consumer use of CCA-treated wood, questions are now being raised about its potential health and environmental risks. High levels of arsenic have been found in soil samples taken from residential sites (around decks) where CCA-treated wood was used. For those working with the wood, there are additional concerns about risks of exposure. Disposal concerns have arisen because tests indicate that most of the arsenic remains in the wood after its useful life. These and other factors have led people to seek out alternatives, including [recycled plastic lumber](#) and wood that is treated with less toxic chemical preservatives such as Ammoniacal Copper Quaternary (ACQ, types B, C, and D), Copper Azole (types A and B) or sodium silicates.

The United States Environmental Protection Agency (USEPA) has phased out residential usage of wood treated with CCA. For more information, see the [Laws and Guidelines](#) section.

Wood can be treated with other pesticides such as pentachlorophenol or creosote; however, these preservatives are normally used on pilings, utility poles, or railroad ties. [\[4\],\[5\]](#) Wood treated with these preservatives may be hazardous and use of recycled utility poles or railroad ties should be avoided if people will come into direct contact with them.

Before buying or using treated wood, consider where the wood will be used and investigate alternative materials. Anyone using treated wood should weigh these factors:

- Will the wood be used indoors or outdoors?
- Will people or animals come into direct contact with the wood?
- Will the wood come in contact with any drinking water source?
- Will the wood come in contact with any water body, such as a lake, stream, or ground water?
- Is there a less toxic or nontoxic alternative to using treated wood? [\[6\]](#)

## ALTERNATIVE MATERIALS

There are a variety of less toxic materials suitable for many projects as substitutes for treated wood. Some examples include:

- Metal for structural applications and plastic for docks, decks and other outdoor amenities. For more information, see the [Recycled Plastic Lumber section](#).
- Untreated, sustainably harvested cedar or redwood in places where people come in direct contact with the material.
- Landscape blocks or rocks for landscaping projects.
- Steel pilings filled with concrete in place of creosote-treated underground construction pilings.
- Wood treated with less toxic preservatives, such as ACQ and Copper Azole.

Wood treated with the copper-based ACQ and Copper Azole should be avoided near aquatic ecosystems, since copper is highly toxic to many aquatic organisms. [\[7\]](#) Note that ACQ-treated wood is more corrosive to certain types of metal fasteners than CCA-treated wood. [\[8\]](#) Information on appropriate fasteners can be obtained from manufacturers of treated wood products.

## LAWS AND GUIDELINES

## California

### Statute

California law [[Chapter 597, Statutes of 2004 \(Matthews, AB 1353\)](#)] requires treated wood waste to be disposed of in either a class I hazardous waste landfill or in a composite-lined portion of a solid waste landfill unit that meets specified requirements. All variances granted by the Department of Toxic Substances Control before January 1, 2005 governing the management of treated wood waste are inoperative and have no further effect.

### Federal

The USEPA has phased out usage of wood treated with CCA. In spring 2002, the USEPA announced a voluntary decision by industry to move consumer use of treated wood away from a variety of pressure-treated woods that contain arsenic by December 31, 2003. Today, existing stocks of CCA-treated wood may be sold until depleted, and consumers may still buy and use this old stock. But no new product will be sold for residential use. For more information, see the USEPA's [CCA Guidance](#) page.

## PERFORMANCE

ACQ- and Copper Azole-treated wood contains no USEPA-listed hazardous compounds. It meets the same standards for above-ground and ground contact established by the International Conference of Building Officials (ICBO) and the [American Wood-Preservers' Association](#) (AWPA) for CCA-treated wood. According to a manufacturer of the ACQ preservative, 99 percent of the preserved wood market could be served with ACQ-treated wood. Similarly, much of the preserved wood market could be served with Copper Azole-treated wood. [\[9\]](#)

## AVAILABILITY AND VENDORS

There are a number of manufacturers in western states producing ACQ-treated wood and Copper Azole-treated wood. Lists of suppliers of these products are available in the Oikos Green Building Source Product Directory. See also the [product directories](#) listed in the California Integrated Waste Management Board's (CIWMB) [Sustainable Building Tool Kit](#).

## COST

***Note: The following discussion on cost is general and is not meant to reflect specific contracts or to supersede existing mandates or policies.***

"Products made from low-toxicity preservatives are expected to cost 10 percent to 20 percent more than CCA-treated lumber." [\[10\],\[11\]](#) Additional costs may be incurred for end-of-life management of treated wood waste due to California law [[Chapter 597, Statutes of 2004 \(Matthews, AB 1353\)](#)] which requires treated wood waste to be disposed of in either a class I hazardous waste landfill or in a composite-lined portion of a solid waste landfill unit that meets specified requirements.

## SPECIFICATIONS

### California

Any project calling for treated wood should include specifications that require ACQ-treated wood and Copper Azole-treated wood. Specifications should also require that the delivered product comply with the [Uniform Building Code for wood preservative treatment](#) and be identified with the ACQ Wood Preservative Treatment mark or Copper Azole Wood Preservative Treatment mark.

Consider including language in future contracts that requires manufacturers to identify the quantity of toxic metals per unit of wood (e.g., mg / kg) and award more points to manufacturers who can provide a product that contains less toxic metals, while meeting performance standards.

The [Procurement Engineering Team](#) of the Department of General Services' Procurement Division develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, [contact the team](#).

## RESOURCES AND WEBSITES

### [American Wood-Preservers' Association \(AWPA\)](#)

Birmingham, AL  
(205) 733-4077

The AWPA is a non-profit organization responsible for promulgating voluntary wood preservation standards.

### [BANCCA.ORG](#)

Gainesville, FL

BANCCA.ORG is a comprehensive online reference for consumers and end users of CCA Pressure Treated Wood. This Web site features many articles and resources on the use and disposal of CCA, and includes a [directory of alternative products](#).

### [BuildingGreen.com](#)

Brattleboro, VT  
(802) 257-7300

BuildingGreen.com offers both print and electronic resources to help design and build construction projects from a whole-systems perspective and take an integrated design approach that minimizes ecological impact and maximizes economic performance. BuildingGreen.com publishes [Environmental Building News](#), a publication that features articles on energy and resource-efficiency, healthy building practices, and environmental building materials.

### [California Integrated Waste Management Board \(CIWMB\)](#)

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. See the [product directories](#) listed in the [Sustainable Building Tool Kit](#).

### [California Department of Toxic Substances Control \(DTSC\)](#)

The DTSC's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. More than 1,000 scientists, engineers and specialized support staff work in [ten DTSC locations](#) statewide. Visit the DTSC's [Treated Wood Waste](#) website.

### **Florida Center for Solid and Hazardous Waste Management**

Gainesville, FL  
(352) 392-6264

Sponsored by the Florida Center for Solid and Hazardous Waste Management, the [CCAResearch.org](http://CCAResearch.org) Web site contains current CCA-related research and publications.

**Healthy Building Network (HBN)**

Washington, DC

(202) 898-1610

A project of the Washington, DC office of the Institute for Local Self-Reliance, the HBN is a national network that promotes healthier building materials as a means of improving public health and preserving the environment. The HBN maintains a Web page on [arsenic-treated wood and alternatives](#), featuring articles and a downloadable fact sheet.

**Minnesota Pollution Control Agency (MPCA)**

St. Paul, MN

(651) 296-6300

(800) 657-3864

The MPCA is a state agency that provides information and assistance on pollution prevention practices to ensure compliance with state and federal regulations involving air quality, surface and ground water, and solid and hazardous waste. See the fact sheet titled "Treated Wood: Use, Disposal and Alternatives for Businesses."

**Oikos Green Building Source**

Bend, OR

(541) 317-1626

Oikos is a Web site devoted to serving professionals whose work promotes sustainable design and construction. The site features hundreds of articles covering environmental building practices along with information on CCA and alternatives.

**United States Environmental Protection Agency (USEPA)**

Washington, DC

(202) 272-0167

The USEPA is reviewing older pesticides (those initially registered prior to November 1984) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to ensure that they meet current scientific and regulatory standards. This process, called reregistration, considers the human health and ecological effects of pesticides and results in actions to reduce risks that are of concern. See the USEPA's [CCA Web page](#).

**United States Department of Agriculture (USDA)**

Forest Service

[Forest Products Laboratory](#)

Madison, WI

(608) 231-9200

Established in 1910 by the United States Department of Agriculture Forest Service, the Forest Products Laboratory (FPL) serves the public as the nation's leading wood research institute. The FPL is recognized both nationally and internationally as an unbiased technical authority on wood science and use.

**END-OF-LIFE MANAGEMENT**

California law [[Chapter 597, Statutes of 2004 \(Matthews, AB 1353\)](#)] requires treated wood waste to be disposed of in either a class I hazardous waste landfill or in a composite-lined portion of a solid waste landfill unit that meets specified requirements. All variances granted by the Department of Toxic Substances Control before January 1, 2005 governing the management of treated wood waste are inoperative and have no further effect.



- [1] United States Environmental Protection Agency. Pesticides: Reregistration, Chromated Copper Arsenate (CCA): Alternatives to Chromated Copper Arsenate Web page. Available at [www.epa.gov/oppad001/reregistration/cca/alternativestocca.htm](http://www.epa.gov/oppad001/reregistration/cca/alternativestocca.htm). Accessed on December 28, 2005.
- [2] Ibid.
- [3] J.M. Syken. "The Green Thumb: The Road Less Traveled (A Second Look, Part Five)." Walls & Ceilings. Posted on July 1, 2005. Available at the "Walls and Ceilings" web site.
- [4] United States Environmental Protection Agency. Pesticides: Topical & Chemical Fact Sheets, Preliminary Risk Assessment Pentachlorophenol ("Penta"), HCB and Dioxin: Questions and Answers Web page. Available at [www.epa.gov/pesticides/factsheets/chemicals/pentachlorophenol.htm](http://www.epa.gov/pesticides/factsheets/chemicals/pentachlorophenol.htm). Accessed on December 28, 2005.
- [5] United States Environmental Protection Agency. Pesticides: Topical & Chemical Fact Sheets, Preliminary Risk Assessment for Creosote Web page. Available at [USEPA](http://USEPA). Accessed on December 28, 2005.
- [6] Minnesota Pollution Control Agency, "Treated Wood: Use, Disposal and Alternatives for Businesses," March 2000, [www.pca.state.mn.us/waste/pubs/4\\_67.pdf](http://www.pca.state.mn.us/waste/pubs/4_67.pdf)
- [7] Alex Wilson and Mark Piepkorn (eds.). Green Building Products: the GreenSpec® Guide to Residential Building Materials. New Society Publishers. 2005.
- [8] Richard J. Dolesh, National Recreation and Park Association. "Wood-Be Alternatives." Available at [www.nrpa.org/content/default.aspx?documentId=2066](http://www.nrpa.org/content/default.aspx?documentId=2066). Accessed on December 28, 2005.
- [9] See the American Wood-Preservers' Association (AWPA) use categories in "Introduction to AWPA's Use Category System," Treated Wood News (provided by Western Wood Preservers Institute), Summer 2002. Available at [www.wwpinstitute.org/pdffiles/AWPA\\_UseCatSys.pdf](http://www.wwpinstitute.org/pdffiles/AWPA_UseCatSys.pdf).
- [10] Partnership for Advancing Technology in Housing, Technology Inventory Accelerating Awareness of Housing Innovations, ToolBase Services Web site. Wood Preservatives - Low Toxicity. Available at [www.toolbase.org/techinv/techDetails.aspx?technologyID=150#initialcost](http://www.toolbase.org/techinv/techDetails.aspx?technologyID=150#initialcost). Accessed on January 13, 2006.
- [11] Alan Froome. "Wood Treaters Switch to New Chemicals," TimberLine, posted April 1, 2004.

## Paper Products

- [Copier Paper](#)
- [Janitorial Paper Products](#)
- [Other Printing and Writing Paper](#)

## Copier Paper

### Environmental and Health Issues and Recommendations



#### Recycled Content:

Postconsumer fiber comes from paper that has been used by consumers and then collected through recycling programs. Most recycled papers contain a minimum of 10 percent to 30 percent postconsumer materials and are sold in a variety of colors and finishes. One hundred (100) percent postconsumer recycled content papers are also available. Using recycled paper keeps waste paper out of landfills and saves trees. Compared to virgin paper manufacturing, making paper from recycled material reduces climate-changing gas emissions, requires less energy, and lowers air pollution and effluent flows. [1]

- Purchase copier paper with a minimum of 30 percent postconsumer recycled content. 100 percent postconsumer recycled content copier paper is recommended.



#### **Material Availability:**

Using agricultural residues, such as bagasse (sugarcane residue), to make paper offers a beneficial use for what would otherwise be a waste product, and does not entail the additional use of land to provide fiber for use in paper. [2]

- Consider buying copier paper made from agricultural residues.



#### **Less Hazardous:**

Buying paper that is bleached without chlorine or chlorine compounds reduces pollution.

- Choose paper labeled as "processed chlorine-free" (PCF).



#### **End-of-Life Management:**

Fluorescent and dark colors make copier paper harder to recycle.

- Help others to recycle by purchasing only white copier paper. If you must use colored paper, use pastel-colored paper.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- Background and Environmental and Health Issues
  - Recycled Content
  - Bleaching Chemicals
  - Fiber
- Laws and Guidelines
- Performance
- Availability
- Cost
- Specifications
- Vendors
- Success Stories
- Resources and Web Sites
- Notes

## **Paper Products – Janitorial Paper Products**

### **Environmental and Health Issues and Recommendations**



#### **Recycled Content:**

Using virgin material (comes directly from trees) to produce janitorial paper products, which are single-use non-recyclable items, is an inefficient use of valuable natural resources.

Total recycled content = postconsumer content + secondary content

Postconsumer material comes from paper that has been used by consumers and then collected through recycling programs.

Secondary material consists of "fragments of finished products or finished products of a manufacturing process, that has converted a resource into a commodity of real economic value, but does not include excess virgin resources of the manufacturing process, such as fibers recovered from wastewater, trimmings of paper machine rolls, mill broke, plastic, or metal trimmings, or shavings, or other residue from a manufacturing process." [\[1\]](#) Secondary material is recycled before it reaches consumers.

Most janitorial paper products - bathroom and facial tissues, paper towels, and toilet seat covers - are available with recycled content, and many have high levels of postconsumer content. Using recycled janitorial paper products keeps waste paper out of landfills and saves trees.

- When purchasing janitorial paper products, follow this content hierarchy:
  - Postconsumer material
  - Secondary material
  - Virgin material from sustainably harvested non-old growth and non-endangered forests.**Note:** Whenever possible, avoid janitorial paper products that contain any virgin material. For more information, see the [Fiber section](#).



#### **Less Hazardous:**

Buying paper products that are bleached without chlorine or chlorine compounds reduces pollution.

- Choose janitorial paper products that are labeled "unbleached," "bleached without chlorine or chlorine derivatives," or "processed chlorine-free."



#### **Prevents Waste:**

People use more folded towels than roll towels. By switching from folded towels to roll towels, you can reduce toweling waste by 25 to 35 percent. In addition, roll towels require less packaging and storage space. [\[2\],\[3\]](#)

Tissue and towel rolls can be produced without paper cores. [\[4\]](#)

- Choose roll towels and coreless tissue and towel rolls.



#### **Global Warming:**

More than a fifth of California's overall disposed waste stream is paper, [\[5\]](#) which, when landfilled, breaks down and produces methane, a potent climate-changing gas. [\[6\],\[7\],\[8\]](#)

- Seek ways to reduce toweling waste so that less paper is landfilled.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
  - [Bleaching Chemicals](#)
  - [Fiber](#)
  - [Waste Prevention](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Story](#)
- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

"At many workplaces, paper towels are the highest volume waste material produced in kitchen, restroom, maintenance shop, and clean-up areas," [\[9\]](#) and it is safe to assume that at least one type of tissue product - bathroom tissue, facial tissue, paper napkins, and/or paper towels - is found in most American workplaces and households. With such widespread use of tissue products, buying processed chlorine-free tissue products with higher levels of recycled content - preferably postconsumer - can significantly reduce environmental impacts. For example, more than half a million trees could be saved if every household in the United States replaced just one roll of 100 percent virgin fiber paper towels (70 sheets) with 100 percent recycled-content towels. [\[10\]](#)

### Environmental and Health Issues

## RECYCLED CONTENT

What could be more wasteful than using virgin [fiber](#) to make janitorial paper products - products that are designed to be thrown away after a single use? Look for janitorial products with 100 percent recycled content and the highest possible levels of postconsumer content. Postconsumer fiber comes from paper - primarily from office paper collection programs [\[11\]](#) - that has been used by consumers and then collected through recycling programs. Most janitorial paper products - bathroom and facial tissues, paper towels, and toilet seat covers - are available with postconsumer content, and many have very high levels of postconsumer content. Using recycled content janitorial paper products saves trees and keeps waste paper out of landfills.

- **What to look for:** Look for products with 100 recycled content and higher levels of postconsumer content. See also the environmentally preferable fiber [hierarchy](#) in the Fiber section.

## BLEACHING CHEMICALS

Additional benefits come from choosing paper products made with less or no chlorine. Bleaching (whitening) paper pulp with elemental chlorine or chlorine compounds produces chlorinated pollutants, such as dioxin, in the wastewater stream. [\[12\],\[13\]](#) According to the United States Environmental Protection Agency, dioxin "is a toxic industrial pollutant that is ... persistent in the environment. It accumulates in the fat tissue of animals and humans and has been linked to adverse human health effects, including cancer and toxicity to reproductive, immunologic, and endocrine systems." [\[14\]](#) Totally chlorine-free bleaching, which uses alternative bleaching agents, such as oxygen and peroxide, eliminates dioxins and other chlorinated pollutants from the wastewater stream. [\[15\]](#) In order to reduce potential risks, a number of manufacturers are switching to chlorine-free technologies.

**What to look for:** When buying janitorial paper products, choose chlorine-free or less-chlorinated products by looking for the following language on labels and in catalogs:

- **"Unbleached"**
- **"Bleached without chlorine or chlorine derivatives"**
- **"Totally chlorine-free" (TCF).** This applies to virgin paper fiber that is unbleached or processed without chlorine or chlorine derivatives.
- **"Processed chlorine-free" (PCF)** applies to recycled paper fiber that is unbleached or bleached without chlorine or chlorine derivatives; however, since some of the waste paper being recycled may previously have been bleached with chlorine, recycled paper products labeled PCF cannot be labeled TCF. If the final product contains any virgin fiber, then that fiber must be TCF.
- **"Elemental chlorine-free" (ECF)** paper fiber is bleached with chlorine derivatives that produce fewer dioxins than elemental chlorine.

## FIBER

In papermaking, a fiber is a tiny thread-like unit of vegetable growth. [16] Fiber is the main component of janitorial paper products, and it can come from sources such as trees or recovered paper.

**What to look for:** Here is a hierarchy of fiber to consider, starting with the most environmentally preferable fiber:

- Postconsumer fiber
- Secondary fiber
- Virgin fiber from sustainably harvested non-old growth and non-endangered forests. **Note:** Whenever possible, avoid janitorial paper products that contain any virgin material.

### Fiber to Avoid

Forests can be rich sources of biodiversity. [17] They are important for fish and wildlife habitat; provide food, shelter, and aesthetic and recreational benefits to humans; help slow global warming by storing and sequestering carbon; and help regulate local and regional rainfall. [18] Avoid janitorial paper products that contain any virgin fiber, especially fiber from old growth forests, endangered forests, and unsustainably harvested forests. These terms may be defined differently by different parties, so to err on the safer side, look for janitorial paper products that contain the highest possible amount of recycled - preferably postconsumer - material. Postconsumer material is a low-risk fiber source. You may also wish to consider paper products for which the content has been certified by an independent third party, such as the [Chlorine Free Products Association](#) or the [Forest Stewardship Council](#).

## WASTE PREVENTION

- People use more folded towels than roll towels because the "easy accessibility of folded towels makes them readily available to grab by the handful." [19] By switching from folded towels to hardwound roll towels combined with controlled-use dispensers, you can reduce toweling waste by 25 to 35 percent. In addition, roll towels require less packaging and storage space. [20],[21] If folded towels must be used, remember that extremely thin folded towels may tear when pulled from a dispenser, causing waste when users grab handfuls of shredded towels.
- Switching to electric hand dryers or cloth towels can reduce paper waste. For more information on these options, see the following resources:
  - California Integrated Waste Management Board, Waste Prevention Information Exchange: Appliances - [Air Dryers](#) Web page.
  - Case study titled "Alternatives to Multi-folded Paper Towels" available from StopWaste.org.
  - [Hand Drying](#) section of the "Environmentally Preferable Purchasing Guide" that is published by the Solid Waste Management Coordinating Board of Minnesota.
- Tissue and towel rolls can be produced without paper cores. [22]

## LAWS AND GUIDELINES

### California

#### Statute

#### [State Agency Buy Recycled Campaign \(SABRC\)](#)

- Recycled-Content Product Procurement Requirements
  - Public Contract Code ([PCC](#)) [section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on paper

products be spent on paper products with at least 30 percent, by fiber weight, postconsumer fiber.

- The SABRC paper product (PP) category includes, but is not limited to, paper janitorial supplies, cartons, wrapping, packaging, file folders, and hanging files, building insulation and panels, corrugated boxes, tissue, and toweling (see [PCC section 12207](#)).
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires PP purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

## Federal

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the [Comprehensive Procurement Guidelines](#) (CPG). Commercial/industrial sanitary tissue products are USEPA-designated items. "Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable." [\[23\]](#) This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [\[24\]](#) The USEPA's recommended recovered fiber content levels for commercial/industrial sanitary tissue products are available [on-line](#).

"Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products." [\[25\]](#)

## PERFORMANCE

"Toilet paper and facial tissue made from recycled paper meet consumer expectations and cost about the same as or less than their non-recycled counterparts ... Paper towels with recycled content are competitive in price and performance." [\[26\]](#)

## AVAILABILITY

**Note:** The following discussion of availability is general. Environmentally preferable janitorial paper products are available from custodial products suppliers for the Away-from-Home (commercial/industrial/institutional) market and from supermarkets and natural foods stores for the At-Home (consumer) market; however, availability differs between the two markets. For example, some tissues and towels that are sold for home use may not be compatible with dispensers that are used in public facilities, and vice versa.

- Bathroom tissue is available with up to 100 percent recycled content and high levels of postconsumer content (up to 80 percent). Processed chlorine-free bathroom tissue is available.
- Facial tissue is available with up to 100 percent recycled content and low to medium levels of postconsumer content (up to 40 percent). Processed chlorine-free facial tissue is available.
- Paper towels are available with up to 100 percent total recycled content and high levels of postconsumer content (up to 80 percent). Processed chlorine-free paper towels are available.



- Toilet seat covers are available with up to 100 percent total recycled content and low to medium levels of postconsumer content.
- Paper napkins are available with up to 100 percent total recycled content and medium to high levels of postconsumer content (up to 80 percent). Processed chlorine-free paper napkins are available.

See the following Conservatree Web pages for detailed information on availability:

- [Master Paper List](#)
- [Tissue Issues: Overview](#)

## **COST**

Recycled-content bathroom tissue, facial tissue, and paper towels in the Away-from-Home market tend to be cost-competitive with, and sometimes less expensive than, their non-recycled counterparts. [\[27\]](#),[\[28\]](#)

Costs may be incurred when switching from folded towel dispensers to roll towel dispensers; however, using roll towels can 1) reduce paper waste and 2) reduce labor costs because they do not have to be replaced as frequently as folded towels. Towel vendors can provide calculations of the potential waste and cost savings of switching to roll towels, [\[29\]](#) and a sample calculation is available in "[Paper Towels](#)," [\[30\]](#) by Nancy VandenBerg. "Paper Towels" also contains helpful information on addressing costs when adjusting specifications.

For a discussion of the costs of different hand drying options (electric hand dryers, cloth towels, and recycled content paper towels), see the [Hand Drying](#) section of the "Environmentally Preferable Purchasing Guide" that is published by the Solid Waste Management Coordinating Board of Minnesota.

## **SPECIFICATIONS**

### **California**

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

### **Tips for Writing Specifications**

*Please note that in California, agencies should refer to the postconsumer content standards set forth in [statute](#).*

### **Green Seal**

Green Seal is a nationally recognized non-profit organization that certifies a variety of environmental products that pass stringent testing standards. Here are its Selection/Recommendation Criteria for Environmentally Preferable Bathroom Tissue and Paper Towels:

- "Where available, purchase bathroom tissue and paper towels certified as environmentally preferable under Green Seal's environmental standards, GS-1 and GS-9, respectively.
- Purchase bathroom tissue and paper towels made of 100% recovered materials.
- Bathroom tissue should contain a minimum of 20% postconsumer waste; paper towels should contain a minimum of 40% postconsumer waste.
- Choose unbleached paper towels first; process chlorine free (PCF), second; elemental chlorine free (ECF), third.
- Select packaging having minimum environmental impact: made of recycled and recyclable materials; imprinted with safe inks; and containing no toxic metals, dyes, inks or fragrances.

Avoid products which are packaged in outer cartons that are inappropriately sized or which contain excessive inner packaging materials.

- Seek items having the largest amount of product. For example, each roll of bathroom tissue should contain at least 40 square feet of product.
- Select high-capacity hardwound roll towels (800 feet or more)." [\[31\]](#)

GS-1 and GS-9 are available [on-line](#).

#### **Other**

"Paper Towels," by Nancy Vandenberg, contains valuable tips for adjusting specifications to address ownership costs, towels, dispensers, and service contracts. For example, Ms. Vandenberg offers the following advice on choosing dispensers, "You must replace the dispensers when switching from folded to roll towels. Caution and a little research can help avoid future problems. Paper companies often supply "proprietary" dispensers designed to accept only their own rolls. Special notches in the roll or end pieces inserted in the core fit special holders in the dispensers. Proprietary dispensers lock users into future use of towels designed for the dispenser. This limits competition for all future bids. "Universal" dispensers are a better choice and all manufacturers make "universal" rolls to fit universal dispensers." [\[32\]](#)

## **VENDORS**

### **Comprehensive Procurement Guidelines Supplier Database**

The USEPA's [Comprehensive Procurement Guidelines Supplier Database](#) is a searchable database of vendors who sell or distribute recycled-content products.

### **Conservatree**

[Conservatree](#), a non-profit organization, maintains [lists of environmentally preferable janitorial paper products](#).

### **Green Seal**

Green Seal, a non-profit organization, recommends specific environmentally preferable janitorial paper products in its document titled "Choose Green Report: Bathroom Tissue and Paper Towels."

In addition, Green Seal prepared a report for the State of California titled "[Environmentally Preferable Bathroom Tissue and Paper Towel Products for the State of California](#)." Green Seal's objective in writing this report was to develop a list of recommended paper towel and bathroom tissue products based on specific environmental attributes.

### **Natural Resources Defense Council**

The Natural Resources Defense Council, a non-profit organization, has an on-line publication titled "[A Shopper's Guide to Home Tissue Products](#)."

### **Recycled-Content Product Directory**

The California Integrated Waste Management Board's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

## **SUCCESS STORY**

### **Highland Hospital**

The following case study is excerpted from the [StopWaste.org](#) Web site:

"Highland Hospital, a 500-bed medical center in Oakland, California, switched from multi-fold paper towels to roll towels in all non-patient restrooms. The hospital has 40 non-patient restrooms with two dispensers in each for a total of 80 dispensers.

### Benefits

"Projected annual savings per roll-towel dispenser are \$8.57. The dispensers have an expected life of five years which means the hospital will save \$3,435 over the life of the dispensers. The simple payback period for this investment is estimated to be three years. Note that this payback estimate does not include the 75 percent reduction in labor costs associated with changing rolls instead of multi-fold towels. Other cost savings include:

- Reduced paper costs, and
- Lower solid waste disposal costs.

"Since people use less paper with roll towels, approximately 43 fewer pounds of paper would accrue per dispenser each year. The total paper towel waste reduction for 80 dispensers is estimated at 3,442 pounds per year (1.74 tons)."

### RESOURCES AND WEBSITES

#### [California Integrated Waste Management Board \(CIWMB\)](#)

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. See the following resources:

- [Recycled-Content Product Directory](#)
- Waste Prevention Information Exchange: Appliances - [Air Dryers](#) Web page

#### [Chlorine Free Products Association \(CFPA\)](#)

Algonquin, IL  
(847) 658-6104

The CFPA is a not-for-profit, state of Illinois corporation. The primary purpose of the association is to promote Total Chlorine Free policies, programs, and technologies throughout the world. The CFPA awards qualified manufacturers the certifications "Processed Chlorine Free" and "Totally Chlorine Free." Visit the [CFPA's Web site](#) for information on its certification and educational services, lists of the paper products it has certified, and relevant news articles.

#### [Conservatree](#)

San Francisco, CA  
(415) 561-6530

Conservatree is a non-profit organization dedicated to converting paper markets to environmental papers. Conservatree's comprehensive Web site provides technical assistance with selecting environmentally preferable papers and paper products. See its [lists of environmentally preferable janitorial paper products](#).

#### [Green Seal](#)

Washington, DC  
(202) 872-6400

Green Seal is a nationally recognized non-profit organization that certifies a variety of environmental products that pass stringent testing standards. See the following resources:

- "Choose Green Report: Bathroom Tissue and Paper Towels." This report contains product recommendations and waste reduction tips.

#### [Minnesota, Solid Waste Management Coordinating Board of \(SWMCB\)](#)

The mission of the SWMCB is to increase the efficiency and environmental effectiveness of the region's solid waste management system. See the [Hand Drying](#) section of the SWMCB's "Environmentally

Preferable Purchasing Guide" for information on different hand drying options, including recycled-content paper towels, electric hand dryers, and cloth towels. [Contact information](#) is available on-line.

#### **Natural Resources Defense Council (NRDC)**

New York, NY  
(212) 727-2700

The NRDC is a non-profit organization, and its purpose is to safeguard the Earth: its people, its plants and animals and the natural systems on which all life depends. See the NRDC's on-line publication titled "[A Shopper's Guide to Home Tissue Products](#)."

#### **United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products, including recycled content janitorial paper products. Visit the USEPA's [Comprehensive Procurement Guidelines](#) (CPG) Web site for Recovered Materials Advisory Notices (RMAN), which recommend recycled-content levels. The site includes a [paper and paper products](#) page, a [paper products fact sheet](#) for 2004, a [CPG Supplier Database](#), and a [Database of Environmental Information for Products and Services](#).

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## Other Printing and Writing Papers

## Environmental and Health Issues and Recommendations



### **Recycled Content:**

Postconsumer paper [fiber](#) comes from paper that has been used by consumers and then collected through recycling programs. Recycled-content options exist within most grades of paper, and most recycled papers contain a minimum of 10 to 30 percent postconsumer material. One hundred (100) percent postconsumer recycled content papers are available within a number of paper grades. Compared to virgin paper manufacturing, making paper from recycled material saves trees, reduces climate-changing gas emissions, requires less energy, lowers air pollution and effluent flows[\[1\]](#), and conserves landfill space.

- Look for paper with the highest postconsumer content available in the specific grade.



### **Materials Availability:**

Using agricultural residues, such as bagasse (sugarcane residue), to make paper offers a beneficial use for what could otherwise be a waste product, and does not entail the additional use of land to provide [fiber](#) for use in paper.[\[2\]](#)

- Consider buying paper made from agricultural residues.



### **Less Hazardous:**

Buying paper that is unbleached or bleached without chlorine or chlorine compounds reduces pollution.

- Whenever possible, choose paper labeled as "processed chlorine-free" because it is produced with a less hazardous process and it includes recycled fiber. For information on different chlorine-free designations, see "[Bleaching Chemicals](#)."



### **End-of-Life Management:**

- Help others to recycle by avoiding heavily dyed papers and coated papers, which are more difficult to recycle.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
  - [Bleaching Chemicals](#)
  - [Fiber](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)



See also the [Copier Paper](#), [Printing Services](#), and [Inks](#) sections.  
**BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

***NOTE: There are numerous grades of printing and writing papers; therefore, it is not possible to provide information in this Manual regarding every available grade of paper. Nearly every common grade of paper is available with at least one environmental attribute, such as some level of postconsumer content.***

Printing paper differs from office copier paper in that it is available in a large range of basis weights, formats, and finishes. Available in different grades, printing papers are used for everything from letterheads and brochures to newsletters, directories, booklet covers, and business cards.

Coated printing papers have a smooth clay coating, while uncoated printing papers have a slightly fibrous surface rather than a clay coating. Coated papers are valued for their smoothness, which allows for "crisp, vibrant reproduction of four-color graphics and photographs."[\[3\]](#)

The environmental impacts of printing paper begin with its production - in tree harvesting, pulping, and bleaching - and continue to the product's end-of-life management.

## **Environmental and Health Issues**

### **RECYCLED CONTENT**

When buying printing paper with postconsumer content, we help to ensure the success of paper recycling by closing the recycling loop. Remember that buying products with postconsumer content directly supports collection programs. Our willingness as consumers to recycle paper - and, just as importantly, to purchase recycled-content paper - results in price reductions and wider selections of recycled-content papers.

Compared to virgin paper manufacturing, making paper from recycled material saves trees, reduces climate-changing gas emissions, requires less energy, lowers air pollution and effluent flows[\[4\]](#), and conserves landfill space.

**What to look for:** Look for paper with higher levels of postconsumer content. See the [Availability](#) section.

### **BLEACHING CHEMICALS**

Additional benefits come from choosing paper made with less or no chlorine. Bleaching (whitening) paper pulp with elemental chlorine or chlorine compounds produces chlorinated pollutants, such as dioxin, in the wastewater stream[\[5\]\[6\]](#). According to the United States Environmental Protection Agency, dioxin "is a toxic industrial pollutant that is ... persistent in the environment. It accumulates in the fat tissue of animals and humans and has been linked to adverse human health effects, including cancer and toxicity to reproductive, immunologic, and endocrine systems."[\[7\]](#) Totally chlorine-free bleaching, which uses alternative bleaching agents, such as oxygen and peroxide, eliminates dioxins and other chlorinated pollutants from the wastewater stream.[\[8\]](#) In order to reduce potential risks, a number of paper manufacturers are switching to chlorine-free technologies.

**What to look for:** When buying paper, choose chlorine-free or less-chlorinated products by looking for the following language on labels and in catalogs:

**"Totally chlorine-free" (TCF).** This applies to tree-free or virgin paper fiber that is unbleached or processed without chlorine or chlorine derivatives.

**"Processed chlorine-free" (PCF)** applies to recycled paper fiber that is unbleached or bleached without chlorine or chlorine derivatives; however, since some of the waste paper being recycled may previously have been bleached with chlorine, recycled paper labeled PCF cannot be labeled TCF. If the final product that is labeled PCF contains any virgin or tree-free fiber, then that fiber must be TCF.

**"Elemental chlorine-free" (ECF)** paper fiber is bleached with chlorine derivatives that produce fewer dioxins than elemental chlorine.

## FIBER

In papermaking, a fiber is a tiny thread-like unit of vegetable growth.<sup>[9]</sup> Fiber is the main component of most printing papers (in terms of the weight of the total sheet, coated papers contain less fiber than uncoated papers), and it can come from sources such as trees, recovered paper, agricultural residues (e.g., bagasse, which is sugarcane residue), and on-purpose non-tree crops (e.g., kenaf, hemp, and flax).

**What to look for:** Here is a hierarchy of fiber to consider, starting with the most environmentally preferable fiber:

- Postconsumer fiber
- Agricultural residue fiber
- On-purpose non-tree crop fiber and/or fiber from sustainably harvested non-old growth and non-endangered forests

### Fiber to Avoid

Forests can be rich sources of biodiversity.<sup>[10]</sup> They are important for fish and wildlife habitat; provide food, shelter, and aesthetic and recreational benefits to humans; help slow global warming by storing and sequestering carbon; and help regulate local and regional rainfall.<sup>[11]</sup> Avoid paper made from fiber from old growth forests, endangered forests, and unsustainably harvested forests. These terms may be defined differently by different parties, so to err on the safer side, consider purchasing paper with the highest amount of postconsumer content possible. Postconsumer material contains no new tree fiber and is a low-risk fiber source. You may also wish to consider papers for which the content has been certified by an independent third party, such as the [Forest Stewardship Council](#) or the [Chlorine Free Products Association](#).

## LAWS AND GUIDELINES

### California

#### *Statute and Regulation*

##### State Agency Buy Recycled Campaign (SABRC)

- Recycled-Content Product Procurement Requirements
  - Public Contract Code ([PCC](#)) [section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on printing and writing papers (PW) be spent on papers with at least 30 percent, by fiber weight, postconsumer fiber. Printed newspapers that meet the requirements of the recycled-content newsprint law ([Public Resources Code sections 42750-42791](#)) are considered to be in compliance with the minimum content requirement.
  - The SABRC printing and writing paper (PW) category includes, but is not limited to, copy, xerographic, watermark, cotton fiber, offset, forms, computer printout paper, white wove envelopes, manila envelopes, book paper, note pads, writing tablets, newsprint, and

other uncoated writing papers, posters, index cards, calendars, brochures, reports, magazines, and publications (see [PCC section 12207](#)).

- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires PW purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217](#)(f) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

### Recycled-Content Newsprint Program

The requirements of the [Recycled-Content Newsprint Program](#) are set forth in statute ([Public Resources Code](#) sections 42750-42791) and regulations (California Code of Regulations, [Title 14, Division 7, Chapter 4, Article 4, Sections 17950-17974](#)).

California law mandates the use of a specified amount of recycled-content newsprint (RCN) by printers and publishers located in California. The California Integrated Waste Management Board (CIWMB) implements a program to encourage and track the use of RCN.

- At least 50 percent of the newsprint used by each printer and publisher (consumers) in California must contain a minimum of 40 percent postconsumer paper fiber.
- Consumers must report annually to the CIWMB the total amount of RCN and the total amount of non-RCN used.
- Manufacturers must report the de-inked pulp received and/or produced, the postconsumer paper received, and the amount of RCN shipped to California.
- State of California agencies and departments cannot purchase newsprint from manufacturers who are not in compliance with the program.

### Federal

- The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the [Comprehensive Procurement Guidelines](#) (CPG). Printing and writing papers are USEPA-designated items. "Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable."<sup>[12]</sup> This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met.<sup>[13]</sup> The USEPA's recommended recovered fiber content levels for printing and writing papers are available [on-line](#).

"Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products."<sup>[14]</sup>

- **United States Environmental Protection Agency**

The United States Environmental Protection Agency has set the following objective:

All printing paper products used by EPA are to meet the standards of the "New Environmental Standards for EPA Paper and Publications" set forth by memorandum of January 2001. This standard sets the standard for paper and publications as 100 percent recycled, minimum 50 percent postconsumer content paper. Whenever possible, this paper should also be "Process Chlorine Free." Some paper stocks, especially color paper stocks, may not be readily available with this content standard. When this situation

arises, a minimum 30 percent postconsumer content is required. (Products mentioned in this section include but are not limited to the following applications: Copy Paper, Printing Paper, Letterhead, Envelopes, and Color Paper.)[\[15\]](#)

## PERFORMANCE

Recycled and tree-free papers can be manufactured to meet the same performance standards as virgin paper made from wood pulp. Furthermore, recycled and tree-free papers often exceed virgin paper for opacity. Simply put, they are harder to see through, which is of particular benefit when printing double-sided documents. Recycled paper does not have to "look recycled," meaning it is available without the speckles, flecks, and color shadings which are included in some recycled papers as product enhancements for aesthetic reasons.

"There are no simple rules-of-thumb to allow buyers to select paper products that will satisfy their individual needs. Buyers must either create specifications to quantify specific requirements or, more often, ... learn which products perform adequately in their unique circumstances." [\[16\]](#) Fortunately, paper distributors maintain knowledgeable customer service departments and are able to provide good information about their products.[\[17\]](#) In addition, paper manufacturers will provide printed samples that describe the paper stock and printing techniques used for each sample.

## AVAILABILITY

The paper marketplace has always offered buyers many choices among virgin papers, and now it offers a similar range of products with postconsumer content. Tree-free and chlorine-free papers are becoming more popular, but availability is likely to vary by print shop. Consult your printer when choosing a printing paper. Ask to see their current lists of vendors and the printing papers offered, as well as current swatchbooks showing the wide variety of available styles. You may also wish to refer your printer to existing lists of environmentally preferable papers, such as the comprehensive lists that are available from [Conservatree](#), a non-profit organization that is dedicated to converting paper markets to environmental papers. This may allow your printer to encourage their vendors to expand their selection of environmentally preferable papers in the future.

- **Uncoated papers:** Most grades of uncoated papers are available with postconsumer content, and some commonly used text and cover papers are available with up to 100 percent postconsumer content and/or processed chlorine-free fiber.
- **Coated papers:** Coated papers are available with postconsumer content, and some are available with up to 50 percent postconsumer content and/or processed chlorine-free fiber.
- **Acid-free papers:** Many environmentally preferable papers are acid-free for archival longevity. This includes papers made with postconsumer paper fiber, pre- and postconsumer cotton, organic cotton, tree-free fiber, processed chlorine-free fiber, and many combinations thereof.

## COST

Many grades of paper, "such as text and cover (often used for letterhead, brochures and publications) and some coated papers are cost-competitive with virgin papers or even cost less."[\[18\]](#) Tree-free papers are often more expensive, but are becoming more competitive as availability expands. Remember that paper markets for all types of paper (virgin and recycled) are always in a state of flux.

You can reduce paper and postage costs by:

- Working with your printer to optimize trim size.
- Lowering the paper basis weight, if possible.
- Printing on both sides of the paper.
- Reducing the width of margins and font size, if appropriate.[\[19\]](#)

## SPECIFICATIONS

### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

Government agencies may also wish to contact a [Customer Service Representative](#) at the Office of State Publishing.

### Tips for Writing Specifications

#### *Sample Language*

When buying printing paper, include specifications which require the paper to consist of at least 30 percent, by fiber weight, postconsumer fiber and to be processed chlorine-free. Besides environmental and health benefits, your specifications can ultimately help lead to better prices by increasing demand for recycled-content, chlorine-free paper. Here are two sample clauses:

"All papers must consist of at least 30 percent, by fiber weight, postconsumer fiber. Vendors must certify that papers meet this postconsumer content specification. Vendors must also certify that the papers meet standards for quality, brightness, opacity, and smoothness as specified in this solicitation. Vendors are encouraged to provide products that contain a higher percentage of postconsumer fiber than the 30 percent minimum and are processed chlorine-free."

"All papers must contain 100 percent, by fiber weight, postconsumer fiber and must be processed chlorine-free. Vendors must certify that papers meet these postconsumer content and chlorine-free specifications. Vendors must also certify that the papers meet standards for quality, brightness, opacity, and smoothness as specified in this solicitation."

#### *Other Specifications*

**United States Government Printing Office.** Government Paper Specification Standards.

## VENDORS

### Statewide Contracts

To find statewide recycled-content paper contracts, search the Department of General Service's [Procurement Information Network database](#) by key word or contract number.

Government agencies may also wish to contact an Office of State Publishing (OSP) [Customer Service Representative](#). The OSP uses recycled-content paper on a regular basis.

### Other Sources

Many paper companies can provide information on a wide variety of recycled-content, chlorine-free, and tree-free papers. Talk with your current paper supplier about product lines with the environmental attributes discussed above.

### Conservatree

The non-profit organization [Conservatree](#) maintains comprehensive [lists](#) of environmentally preferable papers within numerous grades.

#### **California Integrated Waste Management Board (CIWMB)**

The CIWMB's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

#### **Minnesota, Solid Waste Management Coordinating Board of (SWMCB)**

The SWMCB's Environmentally Preferable Purchasing Guide lists [printing paper vendors](#).

### **SUCCESS STORIES**

#### **California Integrated Waste Management Board (CIWMB)**

The CIWMB used high postconsumer content processed chlorine-free papers for many of the promotional materials for its high-profile Annual Recycled Product Trade Show. These papers included:

- A coated paper that is processed chlorine-free and 100 percent total recycled content with 50 percent postconsumer content. This paper was used to print the award-winning exhibitor prospectus for the 2005 Trade Show.
- 100 percent postconsumer content, processed chlorine-free, uncoated text and cover papers.
- 90 percent postconsumer content/10 percent hemp/flax blend, processed chlorine-free, uncoated text and cover paper.

#### **Minnesota, Solid Waste Management Coordinating Board of (SWMCB)**

The SWMCB's Environmentally Preferable Purchasing Guide provides environmentally preferable printing paper [success stories](#).

#### **Books**

- In 2003, the Canadian edition of a very popular children's book was printed on 100 percent postconsumer content processed chlorine-free paper. The initial print run was of 930,000 copies.[\[20\]](#)
- In the United States, the [Green Press Initiative](#) is helping to shift the marketplace by enrolling publishers, printers, suppliers, and producers to make formal commitments to eliminate the use of paper with endangered forest fiber and to maximize the use of recycled, credibly-certified, and alternative fiber paper that is produced chlorine free.

### **RESOURCES AND WEBSITES**

#### **[California Integrated Waste Management Board \(CIWMB\)](#)**

Sacramento, CA

(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

The following information is available on the CIWMB's Web site:

- [Paper Information and Resources](#)
- [Paper Products/Printing and Writing Paper Resources](#)
- [Environmentally Preferable Offset/Textbook Printing Paper for the State of California, Project to Green California Procurement, Task 5b](#)

#### **[California Department of General Services, Office of State Publishing \(OSP\)](#)**

Sacramento, CA

(916) 322-1032



The OSP's mission is to provide innovative printing and communication solutions through its specialized knowledge, statewide perspective, and coordinated public and private partnership. The OSP will enhance the economic well being and quality of life for all of its customers, employees and other business partners, and its services are available to state, federal, county and city agencies. The OSP uses recycled-content paper on a regular basis.

#### **Chlorine Free Products Association (CFPA)**

Algonquin, IL  
(847) 658-6104

The CFPA is a not-for-profit state of Illinois corporation. The primary purpose of the association is to promote Totally Chlorine Free policies, programs, and technologies throughout the world. The CFPA awards qualified manufacturers the certifications "Processed Chlorine Free" and "Totally Chlorine Free." Visit the [CFPA's Web site](#) for information on its certification and educational services, lists of the paper products it has certified, and relevant news articles.

#### **Conservatree**

San Francisco, CA  
(415) 561-6530

Conservatree is a non-profit organization dedicated to converting paper markets to environmental papers. They maintain a comprehensive Web site that provides technical assistance with selecting environmentally preferable papers. It includes an extensive listing of [environmentally preferable papers](#) that is sorted by specific paper grade.

#### **Fiber Futures**

San Francisco, CA

Fiber Futures is a non-profit organization that provides information on the latest developments in tree-free fiber paper manufacturing and distribution.

#### **Green Press Initiative**

Ann Arbor, MI  
(734) 995-5785

The Green Press Initiative is a non-profit program, and its mission is to work with publishers, industry stakeholders, and authors to create paper-use transformations that will conserve natural resources and preserve endangered forests.

#### **Green Seal**

Washington, DC  
(202) 872-6400

Green Seal is a nationally recognized non-profit organization that certifies a variety of environmental products that pass stringent testing standards. See its reports titled "Choose Green Report: Alternative Fiber Papers" and "Choose Green Report: Printing and Writing Papers."

#### **King County Environmental Purchasing Program**

Seattle, WA  
(206) 296-0100  
(800) 325-6165

King County is a pioneer and contemporary model in environmental procurement. See its [Recycled Paper](#) Web page.

#### **The Paper Calculator**

The Paper Calculator is a Web-based tool that allows you to compare the environmental impacts of specific types of recycled and virgin papers. It is accessible from the Office of the Federal Environmental Executive's Web site.

### **United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products such as recycled-content paper. Visit the USEPA's [Comprehensive Procurement Guidelines](#) (CPG) Web site for Recovered Materials Advisory Notices (RMANs), which recommend recycled-content levels. The site includes a [paper and paper products page](#), a downloadable paper products fact sheet for 2004, a [CPG Supplier Database](#), and a [Database of Environmental Information for Products and Services](#).

### **United States Government Printing Office (GPO)**

Washington, DC  
(202) 512-0000

The GPO is the federal government's primary centralized resource for gathering, cataloging, producing, providing, authenticating, and preserving published information in all its forms. Visit the GPO's Web site to obtain government paper specification standards and contact information for the Paper Procurement Section.

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- [3] Conservatree. Paper Guide: Paper Grade Descriptions Web page, <http://www.conservatree.org/paper/PaperDesc.shtml>.
- [4] Based on calculations made for office paper and newsprint using the Office of the Federal Environmental Executive's Paper Calculator. Available at <http://www.ofee.gov/recycled/calculat.htm>.
- [5] Conservatree. Environmentally Sound Paper Overview: Essential Issues. Part III - Making Paper: Content. Available at <http://www.conservatree.org/learn/Essential%20Issues/EIOverview.shtml>.
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- [12] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Paper Products Fact Sheet. Available at <http://www.epa.gov/cpg/factshts.htm>.
- [13] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.
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- [17] King County Environmental Purchasing Program. Paper, Recycled Web page. Available at [http://www.kingcounty.gov/operations/procurement/Services/Environmental\\_Purchasing.aspx](http://www.kingcounty.gov/operations/procurement/Services/Environmental_Purchasing.aspx)
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## Printing

- [Inks](#)
- [Printing Services](#)

## Printing – Inks

### Environmental and Health Issues and Recommendations



#### Air Quality -- Low Volatile Organic Compounds (VOC):

Seek out low-VOC inks and agri-based inks to help reduce air pollution and promote a healthier work environment.



#### Less Hazardous:

Avoid inks containing heavy metals, such as lead, cadmium, mercury, chromium, and possibly barium. Seek out inks with carbon based substitutes. Colors to avoid include bright yellows, reds, deep reds, and some oranges which have heavy metal pigments.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Story](#)
- [Resources and Web Sites](#)

See also the [Printing Services](#) section.

### BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Before the 1960s, agri-based inks made from vegetable oils were commonplace for all printing applications. The advent of more cost effective and better performing petroleum based inks started a decline in usage of vegetable oil made inks. Petroleum-based inks have a higher volatile organic compound (VOC) content, which comes at a cost to the environment. Most newly reformulated agri-based inks can perform just as well as their petroleum based counter part, resulting in a less damaging impact to the environment.

Some printing inks contain hazardous materials. These range from heavy metals used in coloring, to petroleum-based solvents (used to disperse pigments and accelerate the drying process). When leached into the environment, heavy metals such as barium, copper, and zinc can contaminate soil and groundwater. In addition, inks that contain petroleum solvents emit a higher concentrate of VOC into the air. VOCs can be irritants for print shop workers when present in the form of vapors. They also contribute to the formation of smog.

By contrast, agri-based inks are predominately made from non-toxic soy, or vegetable oils unlike some petrochemicals. Typically soy-based ink contains 7 percent to 40 percent of the total oil in the manufactured ink, which is also a renewable resource. Using soy and other vegetable oils reduces VOC emissions and creates a healthier work environment for print shop employees.

## **LAWS AND GUIDELINES**

### **Federal and California**

- The Federal [Clean Air Act](#) establishes ambient air quality standards for certain air pollutants. VOCs are precursors to ozone, which is one of the pollutants. The California [Air Resources Board](#) and [Air Quality Management Districts](#) (AQMD) establish and enforce regulations to meet federal and any state standards. Specific compliance rules are developed by each AQMD and apply only to emission sources within the jurisdiction.
- The Federal [Resource Conservation and Recovery Act](#) (RCRA) places limits on the disposal of compounds such as heavy metals and certain petroleum hydrocarbons which are hazardous to humans, animals, and plants. The State of California, [Department of Toxic Substances Control](#) (DTSC) establishes and enforces regulations to comply with federal and state standards. State regulations are found in Title 22 of the [California Code of Regulations](#).
- The Federal [Clean Water Act](#) establishes limits on potential harmful compounds such as heavy metals and petroleum hydrocarbons that may be discharged or leached into water bodies. The California Regional Water Quality Control Boards establish and enforce regulations to meet federal and state standards. The primary regulatory source in California is the [California Water Code](#).
- The [Federal Occupational Safety and Health Administration](#) (OSHA) establishes employee exposure limits to various airborne toxic substances including heavy metals and certain petroleum hydrocarbons found in some printing operations. The [California OSHA](#) (Cal/OSHA) establishes and enforces federal and state workplace safety standards. The regulations are codified under Title 8 of the [California Code of Regulations](#). Federal agencies have been subject to similar requirements since 1994 when Congress passed the [Vegetable Ink Printing Act](#).

## **AVAILABILITY**

A wide variety of agri-based inks are available. In general, most ink manufacturers produce at least one line of soy-based inks. Graphic designers and printers can help you avoid inks containing heavy metals while offering alternative colors that will closely match your needs.

## **COST**

Color and black commercial soy inks are competitively priced with petroleum-based inks. Generally, only black soy newsprint inks cost more - about 25 percent higher than petroleum-based black. However, the slightly higher cost of using soybean oil in place of petroleum is offset by the reduced amount of resin needed in colored soy ink formulation; black ink is cheaper to manufacture with petroleum because it does not use the same resins.

## **SPECIFICATIONS**

Purchasers should specify soy-based or other agri-based inks in print jobs. Even if soy is unavailable or inappropriate for a particular print job, there are a variety of other agri-based inks which are made with vegetable oils, including linseed, cottonseed, and Tung oils.

Purchasers are also encouraged to request wax-free ink when the original document is intended to be used for imprinting. Using wax-free ink will ensure a proper bond and reduce smearing when materials are reprinted, thus reducing paper waste.

## **VENDORS**

Many printers and ink manufacturers offer soy-based or other agri-based inks. Ask if your current vendor uses agri-based inks. For alternatives, contact the [Graphic Arts Technical Foundation](#) -- an organization that can give you a list of many vendors which are likely to use soy-based or agri-based inks.

## **SUCCESS STORY**

### **State of California**

The State of California's [Office of State Publishing](#) was one of the first printers in California to use soy-based ink developed for sheetfed, cold-set and heat-set web printing. Now 99 percent of the ink they use is agri-based.

## **RESOURCES AND WEBSITES**

### **California Air Resources Board (ARB)**

The mission of the California Air Resources Board is to promote and protect public health, welfare and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the state. A listing of California's [Air Quality Management Districts](#) is available on-line.

### **California Department of General Services, Office of State Publishing (OSP)**

Sacramento, CA  
(916) 322-1032

The OSP's mission is to provide innovative printing and communication solutions through their specialized knowledge, statewide perspective, and coordinated public and private partnership. They will enhance the economic well being and quality of life for all of their customers, employees and other business partners. Their services are available to state, federal, county and city agencies.

### **California Occupational Safety and Health Administration (Cal/OSHA) Program**

The Cal/OSHA Program is responsible for enforcing California laws and regulations pertaining to workplace safety and health and for providing assistance to employers and workers about workplace safety and health issues. Contact information is available [on-line](#).

### **California Department of Toxic Substances Control (DTSC)**

The DTSC's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. More than 1,000 scientists, engineers and specialized support staff work in [nine locations](#) statewide.

#### **State Water Resources Control Board**

##### **California Regional Water Quality Control Boards**

There are nine Regional Water Quality Control Boards (Regional Boards). The mission of the Regional Boards is to develop and enforce water quality objectives and implementation plans that will best protect the beneficial uses of the State's waters, recognizing local differences in climate, topography, geology and hydrology.

#### **Institute for Local Self-Reliance (ILSR)**

Minneapolis, MN

(612) 379-3815

The ILSR is a non-profit organization that promotes sustainable economic development and maintains an on-line clearinghouse of plant-based products, including vegetable-based inks. "Biochemicals for the Printing Industry," an ILSR report on vegetable-based inks and print shop solvents, includes information on cost and availability.

#### **[Printers' National Environmental Assistance Center \(PNEAC\)](#)**

The PNEAC is a partnership between industry, government, and university technical assistance providers serving those who interact with one of the largest manufacturing industries in the United States, North America, and the world. The PNEAC's mission is to assist regulatory agencies and technical assistance providers by delivering current, reliable environmental compliance and pollution prevention information to printers, publishers, and packagers.

#### **[Printing Industries of America/Graphic Arts Technical Foundation \(PIA/GATF\)](#)**

PIA/GATF Headquarters

Sewickley, PA

(412) 741-6860 or (800) 910-4283

The PIA/GATF is a large graphic arts trade association, representing an industry with 1.2 million employees.

## **Printing – Printing Services**

### **Environmental and Health Issues and Recommendations**



#### **Recycled Content:**

Choose printing paper with a minimum of 30 percent postconsumer recycled content to keep waste out of landfills and conserve natural resources. Papers with higher levels of postconsumer content are available and recommended.



#### **Prevents Waste:**

The waste by-products in the printing process (plates, paper, ink, and solvents) are reduced with:

- proper job planning;
- the use of digital on-demand printing;
- reduced use of multiple ink colors.





#### **Air Quality:**

Low Volatile Organic Compounds (VOCs): Choose a printer that uses low-VOC inks and press chemicals.



#### **Less Hazardous:**

Choose a printer who uses less hazardous [inks and press chemicals](#) and choose [paper](#) that is processed chlorine-free.



#### **End-of-Life Management:**

Make printed materials that are easier to recycle. Use glueless bindings and uncoated paper, and avoid foil stamping, heavy ink coverage, and dark and fluorescent papers.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws](#)
- [Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Print Sources](#)
- [Success Story](#)
- [Resources and Web Sites](#)

See also the [Inks](#) and Other Printing and Writing Papers sections.

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

Designers and buyers of print materials are well aware of the importance and power of the printed piece. You know that your design and production choices directly influence cost and effectiveness. These choices also have an impact on the environment. From pre-press to disposal, the energy and materials involved in the printing process have implications for air and water quality, waste disposal, energy use, and worker safety.

Whether simple or complicated, all printing choices require having the right information and effectively communicating requests to your printer and paper supplier. Build relationships with your printers and use systematic approaches to improve the quality of the final product while achieving gains for the environment.

## **LAWS**

See also the Laws and Guidelines heading of the [Inks](#) section.

### **California**

### **Statute**

#### **State Agency Buy Recycled Campaign (SABRC)**

- Recycled-Content Product Procurement Requirements
  - Public Contract Code ([PCC section 12203](#)) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on printing and writing papers be spent on papers with at least 30 percent postconsumer recycled content.
  - The SABRC printing and writing paper (PW) category includes, but is not limited to, copy, xerographic, watermark, cotton fiber, offset, forms, computer printout paper, white wove envelopes, manila envelopes, book paper, note pads, writing tablets, newsprint, and other uncoated writing papers, posters, index cards, calendars, brochures, reports, magazines, and publications ([see PCC section 12207](#)).
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires PW purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

### **Other**

State law ([Education Code section 32373](#)) encourages educational agencies to purchase recycled paper.

### **California Rules of Court**

The following 2006 California Rules of Court require the use of recycled paper for court documents:

- [Rule 2.101](#) requires court papers to be filed on recycled paper.
- [Rule 10.503](#) requires all courts to use recycled paper for all purposes except for uses for which recycled paper is not practically available.

### **Federal**

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the [Comprehensive Procurement Guidelines](#) (CPG). A number of printing papers are USEPA-designated items. Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable. [1] This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [2],[3] The USEPA's recommended recovered materials content levels for [printing papers](#) are available on-line.

Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [4]

### **GUIDELINES**

Environmentally-sound alternatives abound. Digital production options, recycled (filtered) ink, and chlorine-free and tree-free papers are all viable and readily available choices. Do not assume that they

cost more - some will actually save you time and money. Just as increasing demand for recycled-content paper has resulted in lower prices, greater selection, and wider availability, interest in other environmentally-sound alternatives will expand their availability. Ask printers to keep you informed about the latest technologies and methods. Following are guidelines for use in determining printing specifications:

### **Digital Printing**

High-speed digital printing is an excellent alternative to the traditional lithographic\* printing process. The digital printing process produces a high-quality copy on the very first page, thus eliminating paper waste. Lithographic presses have a higher amount of waste paper and chemical usage as the printed press page is brought up to a usable quality. Lithographic printing is more affordable when printing large quantities of materials, such as voter guides, driving handbooks, and tax booklets.

\* Lithography is a printing process based on the chemical law that fatty, oily inks do not mix with water. It is usually referred to as "offset." [\[5\]](#)

Digital printing is also beneficial in giving on-demand publishing opportunities. On-demand printing eliminates the need to store and inventory larger quantities of printed forms, brochures, directories and publications. Additional quantities can be produced "on-demand" when needed. On-demand printing works particularly well when printing documents that need frequent updating or are also available on your office's Web site.

Digital printing also may provide for regional distributed printing, thereby saving shipping costs and reducing the demand for packaging materials.

### **Multicolor Printing**

It is preferable that only one ink color be used on the printed document unless more colors are needed to convey meaning. Multicolor printing by the traditional lithographic process generates a higher amount of wasted press plates, ink, cleaning solutions, and paper. A full color photo in a printed page will require the use of four press plates, four different ink colors, clean-up on four printing units, and the additional paper waste to set the ink color registration and balance.

Use of full-color digital printing technology will nearly eliminate all waste that is generated in the traditional lithographic printing process.

### **Two-sided Printing**

Printing on both sides of each sheet can reduce paper consumption and cost by half.

### **Printing Papers**

Use paper that is not dyed, except for light or pastel colors, because fluorescent and dark colors make paper harder to recycle. Choose paper that is unbleached or bleached (whitened) without chlorine or chlorine compounds. Totally chlorine-free bleaching, which uses alternative bleaching agents, such as oxygen and peroxide, eliminates dioxins and other chlorinated pollutants from the wastewater stream. [\[6\]](#) According to the United States Environmental Protection Agency, dioxin "is a toxic industrial pollutant that is ... persistent in the environment. It accumulates in the fat tissue of animals and humans and has been linked to adverse human health effects, including cancer and toxicity to reproductive, immunologic, and endocrine systems." [\[7\]](#) Specifications should include the requirement that the paper be "processed chlorine-free" (PCF).

If you are printing a large quantity and have a very specific environmentally preferable paper in mind, you should work with your printing planner to secure that stock well in advance of submitting your project for production.

For more information on environmentally preferable papers, see the Other Printing and Writing Papers and [Copier Paper](#) sections.

### **Printing Inks and Chemicals**

Printing inks and other chemicals used on the press include volatile organic compounds (VOCs) that can be harmful to air quality. Many soy-based inks are now manufactured that have a low VOC content. There are also press chemicals used in the cleaning of the press blankets and rollers that have a low VOC content. Choose a printer that uses low VOC water-based or agri-based inks and press chemicals. Some waste inks may be considered as hazardous waste in California and therefore subject to management requirements specified in [Title 22 of the California Code of Regulations](#). The California Department of Toxic Substances Control has a fact sheet titled [Hazardous Waste Generator Requirements](#).

See also the [Inks](#) section.

### **Job Planning**

Work with your printing planner to design layouts that prevent waste by considering press sheet sizes, gripper margins, bleeds, grain direction and the amount of ink coverage needed. Evaluate the need for redundant packaging such as plastic wrapped packages placed inside a box. Is the plastic wrap necessary?

### **End-of-Life Considerations**

Produce publications that are easier to recycle by using glueless bindings, such as reusable binding materials or stapling; using uncoated paper, and avoiding foil stamping, heavy ink coverage, and dark and fluorescent papers.

### **Electronic Publishing Option**

When developing a printing project, consider the feasibility of publishing the document on the Internet. This option may reduce or eliminate the need for printing altogether.

## **PERFORMANCE**

The key to effective, environmentally-sensitive printing jobs is addressing issues in the design stage. Challenge assumptions about how a publication is "supposed" to look. Keep an open mind to the many possibilities that can effectively get your message to the intended audience and allow for creative, innovative approaches throughout the design and production process. You may find that limiting paper, ink, or production choices because of environmental concerns gives rise to a new range of ideas that will succeed every bit as well and even more efficiently. The best protection against surprises is thorough discussion of options with your printer early on in the design stage. Refer to [Inks](#) and Other Printing and Writing Papers for discussions of the performance of environmentally preferable inks and papers.

## **AVAILABILITY**

Air quality regulations, worker safety concerns, and production efficiencies are encouraging more and more printers to change press operations. Many are turning to low-VOC, digital, and water-based chemistry technologies.

The availability of environmentally preferable papers and inks is growing. Refer to [Inks](#) and Other Printing and Writing Papers for further discussion on these elements of printing. For sources of environmentally preferable papers, see Other Printing and Writing Papers and [Copier Paper](#).

## **COST**

Because each print job is unique, there are many factors that affect cost, regardless of the environmental aspects and options available. The key is establishing those environmentally preferable criteria that are important to you and relying on competition among print services to deliver the best price for the job.

## **SPECIFICATIONS**

When contracting for design or printing services, state your preference for the following content and workplace practices:

- Vegetable-based and recycled (filtered) inks; avoid inks containing heavy metals;
- Papers made with postconsumer fiber (30 percent minimum) and other [environmentally preferable paper fibers](#);
- Processed chlorine-free papers;
- Alcohol-free printing processes;
- Solvents free of toluene and methylene chloride;
- Paper recycling and reuse programs; and
- Workplace safety and accident reduction programs.

Think "reduce, reuse, recycle, and buy recycled" before you design. Refer to [Inks](#) and Other Printing and Writing Papers for additional information on ink and paper considerations.

Give yourself credit: print the percentage of postconsumer content you have used on your printed piece. Also note if the paper is chlorine-free and printed with soy or other agri-based inks, and any other environmental considerations given to the print job.

Not only can you specify environmental attributes for your own print jobs, but you can also require subcontractors to submit work that meets environmental guidelines. Here is a sample specification:

"The contractor shall ensure that printed materials produced under this contract are printed on paper with a minimum of 30 percent postconsumer fiber content. The contractor is encouraged to use paper that contains a higher percentage of postconsumer material than the 30 percent minimum and is processed chlorine-free. These specifications shall be clearly labeled on the printed materials. In addition, the contractor shall print double-sided documents and avoid the use of inks containing heavy metals."

## **PRINT SOURCES**

The [Office of State Publishing](#) and [Prison Industry Authority](#) observe all State laws guiding the acquisition of recycled products and the recycling of post-production waste. Most commercial printers offer a variety of environmentally preferable printing options. Following are options available for the acquisition of printing services.

### **Office of State Publishing (OSP)**

The OSP serves as the centralized printer providing a full range of printing services to all State agencies. Further information is available in [Section 2800 of the State Administrative Manual](#) (SAM), on the [OSP Web site](#), or by calling an OSP Customer Service Representative at (916) 445-9484 (CALNET 485-9484).

#### **Prison Industry Authority (PIA)**

The PIA also provides a wide range of printing and reproduction services to all state agencies on a smaller scale. Further information is available in [Section 2860 of the SAM](#), on the [PIA Web site](#), or by calling a PIA Customer Service Representative at (916) 358-2727 (CALNET 434-2727).

#### **Commercial Print Vendors**

The OSP maintains a listing of over 900 commercial printing vendors located throughout California. These vendors are categorized by the type of printing services they offer such as envelopes, quick copy, publication, and die cutting, etc. OSP Printing Procurement is available to acquire printing services from commercial printers on behalf of State agencies. Further information is available on the [OSP Web site](#), or by calling an OSP Customer Service Representative at (916) 445-9484 (CALNET 485-9484).

### **SUCCESS STORY**

The Department of Justice produces a Legal Source Book for use by law enforcement agencies. This 1,000+ page publication is revised six times a year. There are anywhere from 100 to 150 books printed of each revision. To do this printing by the traditional lithographic method would be very costly and would generate a significant amount of waste. A job this size would require over 62 aluminum press plates to produce. (The number of plates required would be multiplied by the number of ink colors if this were a multicolor job).

This job is ideal for on-demand publishing by high-speed digital printers because of its short run quantity and being a single color publication. After the publication has been revised, the electronic file is sent to the digital printer. The digital printer prints the exact quantity of books without wasting any paper in the process and the process does not require the use of aluminum press plates.

### **RESOURCES AND WEBSITES**

#### **[California Department of General Services, Office of State Publishing \(OSP\)](#)**

Sacramento, CA  
(916) 322-1032

The OSP's mission is to provide innovative printing and communication solutions through their specialized knowledge, statewide perspective, and coordinated public and private partnership. They will enhance the economic well being and quality of life for all of their customers, employees and other business partners. Their services are available to state, federal, county and city agencies.

#### **[California Prison Industry Authority \(PIA\)](#)**

(916) 358-2727

The PIA is an inmate work program that provides productive job opportunities for inmates in California correctional institutions. The PIA provides work assignments for prison inmates and operates numerous service, manufacturing, and agricultural industries at prisons. These industries produce a wide variety of goods and services, including printing services. PIA products and services are available to government entities, including federal, State, and local governmental agencies.

#### **[Alternative Low-VOC, Low Toxicity Clean-up Solvents for the Lithographic Printing Industry](#)**

Institute for Research and Technical Assistance (IRTA)

Under Contract #02-T2475 with the California Department of Toxic Substances Control



The [Institute for Research and Technical Assistance](#) (IRTA) worked with ten lithographic printing facilities in the Los Angeles Metropolitan Area to identify, test and demonstrate alternative low-volatile organic compound (VOC), low toxicity on-press cleaners. Businesses included in the study printed on newsprint (newspapers), coated and uncoated paper, and metal and plastic media. The types of presses were cold-set web, sheet fed, and heat set web and types of ink included soy and solvent borne. The alternatives that were tested and found to be most effective include water-based cleaners, soy-based cleaners and acetone, blends of the three categories of cleaners and blends of the cleaners with small amounts of VOC solvents. Acetone is not classified as a VOC and is low in toxicity.

#### **California Air Resources Board (ARB)**

The mission of the ARB is to promote and protect public health, welfare and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the state. A listing of California's [Air Quality Management Districts](#) is available on-line.

#### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the CIWMB's [Paper Information and Resources Web page](#).

#### **California Occupational Safety and Health Administration (Cal/OSHA)**

Program

The Cal/OSHA Program is responsible for enforcing California laws and regulations pertaining to workplace safety and health and for providing assistance to employers and workers about workplace safety and health issues. Contact information is available [on-line](#).

#### **California Department of Toxic Substances Control (DTSC)**

The DTSC's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. More than 1,000 scientists, engineers and specialized support staff work in [nine locations](#) statewide.

#### **State Water Resources Control Board**

##### **California Regional Water Quality Control Boards**

There are nine Regional Water Quality Control Boards (Regional Boards). The mission of the Regional Boards is to develop and enforce water quality objectives and implementation plans that will best protect the beneficial uses of the State's waters, recognizing local differences in climate, topography, geology and hydrology.

#### **Chlorine Free Products Association (CFPA)**

Algonquin, IL  
(847) 658-6104

The CFPA is a not-for-profit State of Illinois corporation. The primary purpose of the association is to promote Total Chlorine Free policies, programs, and technologies throughout the world. The CFPA awards qualified manufacturers the certifications "Processed Chlorine Free" and "Totally Chlorine Free." Visit the [CFPA's Web site](#) for information on its certification and educational services, lists of the paper products it has certified, and relevant news articles.

#### **Conservatree**

San Francisco, CA  
(415) 721-4230

Conservatree is a non-profit organization dedicated to converting paper markets to environmental papers. They maintain a comprehensive Web site that provides technical assistance with selecting environmentally preferable papers. It includes an extensive listing of environmentally preferable papers that is sorted by specific paper grade.

#### **Green Seal**

Washington, DC

(202) 872-6400

Green Seal is a nationally recognized non-profit organization that certifies a variety of environmental products that pass stringent testing standards. Download its ["Choose Green Report" on printing and writing papers](#).

#### **Institute for Local Self-Reliance (ILSR)**

Minneapolis, MN

(612) 379-3815

The ILSR is a non-profit organization that promotes sustainable economic development and maintains an on-line clearinghouse of plant-based products, including vegetable-based inks. "Biochemicals for the Printing Industry," an ILSR report on vegetable-based inks and print shop solvents, includes information on cost and availability.

#### **King County Environmental Purchasing Program**

Seattle, WA

(206) 296-4210

A pioneer and contemporary model in environmental procurement, King County provides sample contract specifications for paper, printing requirements, and a variety of other products. In addition, its Web site offers procurement case studies along with resources for environmental purchasing and waste reduction.

#### **The Paper Calculator**

The Paper Calculator is a Web-based tool that allows you to compare the environmental impacts of specific types of recycled and virgin papers. It is accessible from the Office of the Federal Environmental Executive's Web site.

#### **Printers' National Environmental Assistance Center (PNEAC)**

The PNEAC is a partnership between industry, government, and university technical assistance providers serving those who interact with one of the largest manufacturing industries in the United States, North America, and the world. The PNEAC's mission is to assist regulatory agencies and technical assistance providers by delivering current, reliable environmental compliance and pollution prevention information to printers, publishers, and packagers.

#### **Printing Industries of America/Graphic Arts Technical Foundation (PIA/GATF)**

PIA/GATF Headquarters

Sewickley, PA

(412) 741-6860 or (800) 910-4283

The PIA/GATF is a large graphic arts trade association, representing an industry with 1.2 million employees.

#### **United States Environmental Protection Agency (USEPA)**

Washington, DC

(202) 272-0167

The [Design for the Environment](#) (DfE) program is one of the USEPA's premier partnership programs, working with individual industry sectors to compare and improve the performance and human health and environmental risks and costs of existing and alternative products, processes, and practices. [DfE](#)

[partnership projects](#) promote integrating cleaner, cheaper, and smarter solutions into everyday business practices. Visit the [DfE Printing Partnership Projects Web page](#).

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- [1] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Paper Products Fact Sheet. Available at [www.epa.gov/cpg/factshts.htm](http://www.epa.gov/cpg/factshts.htm).  
[2] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.  
[3] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Paper Products Fact Sheet. Available at: [www.epa.gov/cpg/factshts.htm](http://www.epa.gov/cpg/factshts.htm).  
[4] Ibid.  
[5] Charles Finley, Ph.D. *Printing Paper and Ink*, Delmar Publishers, Albany, New York, 1997, p. 411.  
[6] United States Environmental Protection Agency, *Fact Sheet: The Pulp and Paper Industry, the Pulping Process, and Pollutant Releases to the Environment* (1997), 2-3. Available at [www.epa.gov/waterscience/pulppaper/jd/fs2.pdf](http://www.epa.gov/waterscience/pulppaper/jd/fs2.pdf).  
[7] United States Environmental Protection Agency, ORD/NCER STAR Grants Dioxin Research Web page (2000). Available at [es.epa.gov/ncer/publications/topical/dioxin.html](http://es.epa.gov/ncer/publications/topical/dioxin.html).

## Vehicles/Transportation

- [Motor Oil](#)
- [Antifreeze](#)
- [Parts Washing](#)
- [Retread Tires](#)
- [Traffic Control Products](#)
- [Road Aggregate](#)
- [Rubberized Asphalt Concrete](#)
- [Alternative Fueled Vehicles: FFV & HEV \(for light-duty vehicles\)](#)
- [Alternative Fueled Vehicles: FFV & HEV \(for heavy-duty vehicles\)](#)

## Vehicles/Transportation – Motor Oil

### Environmental and Health Issues and Recommendations



#### Recycled Content:

More than 90 million gallons of used motor oil are generated in California each year. [1] This represents a domestic supply of oil suitable for re-refining into new oil. Purchase rerefined oil to support a market for oil collected through local recycling programs.

- Buy rerefined lubricating oils with at least 70 percent rerefined base stock.



#### End-of-Life Management:

After motor oil has been drained from the vehicle, it becomes a hazardous waste known as used oil, which must be properly collected and recycled after its initial use. Motor oil never wears out; it only gets dirty, and can be rerefined into new lubricating oil in an endless loop.

See the [Introduction](#) for a complete description of this environmental issue.

- [Background and Environmental and Health Issues](#)

- [Recycled Content](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Californians purchase more than 150 million gallons of motor oil each year, and generate more than 90 million gallons of used motor oil every year - a hazardous waste that must be properly collected and recycled to avoid harming human health and the environment. The highest and best use of used motor oil is to re-refine it into new motor oil. Rerefined motor oil is equal in performance to virgin motor oil because it meets the same quality standards. Currently, most of the used motor oil is blended with other fuels and shipped overseas. However, if more rerefined motor oil were purchased by fleet managers, less used oil would be available to be burned for fuel - resulting in fewer air emissions and a higher and better use for used motor oil. [2]

### Environmental and Health Issues

#### RECYCLED-CONTENT

Compared to crude oil refining to produce virgin lubricating oil, producing lubricating oil from used motor oil requires less energy, and conserves valuable crude oil, a non-renewable resource. Many California state and local agencies, the Federal government, and private companies already use rerefined oil in their vehicle fleets.

- Rerefined motor oil conserves the crude oil supply by re-using the motor oil rather than having to extract additional crude oil from diminishing domestic supplies or importing additional crude oil from foreign countries. For every gallon of used oil recycled, 2.5 quarts of rerefined motor oil can be produced. Buying rerefined motor oil reduces our dependence on foreign oil.
- Conserving our non-renewable oil supplies is not the only benefit. By buying rerefined motor oil, less used motor oil will be used as fuel, resulting in cleaner air (currently, more than half of all used motor oil is recycled into fuel oil cutter stock, where it is blended with off-specification or heavy crude based materials and burned as fuel, resulting in air pollution from phosphates, sulfur, and heavy metals). [3]

**What to look for:** Look for motor oil labeled or sold as "rerefined motor oil."

#### LAWS AND GUIDELINES

##### California

##### *Statute*

##### [State Agency Buy Recycled Campaign \(SABRC\)](#)

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on lubricating oils (LO) be spent on LOs with a base oil content consisting of at least 70 percent rerefined oil.
  - The SABRC LO product category includes, but is not limited to, any oil intended for use in a crankcase, transmission, engine, power steering, gearbox, differential chainsaw, transformer dielectric fluid, cutting, hydraulic, industrial, or automobile, bus, truck, vessel, plane, train, heavy equipment, or machinery powered by an internal combustion engine. (See [PCC section 12207](#).)
- Recycled-Content Certification Requirements
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires LO purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

## Other

- [PCC sections 10405-10409](#) require State and local agencies to purchase lubricating oil and industrial oil from the seller whose oil product contains the greater percentage of recycled oil (with exceptions noted for oil not reasonably available within a reasonable period of time, for oil unable to meet reasonable performance standards of the procuring agency, and for oil available at a greater cost than a comparable virgin oil product).

## Policy

In [Management Memo 01-22](#), the Department of General Services (DGS), Office of Fleet Administration announced the availability of rerefined oil for State vehicles during required oil change services, and strongly encourages State drivers to utilize [State garages](#) and authorized vendors offering rerefined oil for oil change services.

## Federal

Under federal Executive Order 13101, federal agencies have been required since 1999 to buy motor oil and other lubricants with a minimum of 25 percent rerefined base stock.

## PERFORMANCE

Rerefined oil has been used in California and throughout the United States with great success for many years, even in high-performance, mission-critical safety vehicles.

As shown by extensive laboratory testing and field experience, rerefined oil provides a high-quality base stock that is virtually indistinguishable and equivalent in appearance and quality to virgin oil. In addition, the [American Petroleum Institute](#) (API), which sets the standards for most auto and equipment manufacturer warranties, has certified rerefined oils that pass the same cold-start, pumpability, rust corrosion, engine wear, and high-temperature viscosity tests as virgin oils do, thus ensuring consistent

performance standards for all engine oils. To find products meeting these requirements, look for the API starburst on the oil container or on the document accompanying an order for lubricants.

The API subjects rerefined oil products to the same stringent performance standards that are applied to virgin oil products. The API, which includes members that are manufacturers of new cars and new engines, recommends the use of API-certified oil. Given that the performance tests for rerefined oil and virgin oil are the same, the products are equivalent. For example, if a rerefined motor oil carries the API starburst certification mark, or API "donut" service symbol of approval, it is guaranteed to meet the same performance standards as any similarly certified virgin oil. [\[4\]](#) In fact, according to the United States Environmental Protection Agency (USEPA), extensive testing from the National Institute of Standards and Technology and the United States Army concluded that rerefined oil is equivalent to virgin oil, passes all prescribed tests, and can even outperform virgin oil. [\[5\]](#)



API Starburst Certification Mark



API "Donut" Service Symbol

Generally, rerefined engine oils can be used without warranty concerns in vehicles made by all of the major automotive manufacturers. Warranty requirements are typically based on performance criteria and not on the origin of the base oil. Most manufacturers have certified rerefined oils to be as good as their virgin equivalents. Contact the automotive manufacturer for further details and general disclaimers.

A note on why rerefined oil is not as widely accepted as it could be: Today, rerefined motor oil meets the same performance standards as virgin motor oil. However, historical concerns about the quality of rerefined oil have continued to reduce consumer demand. In the 1940s and 1950s, some used motor oil was minimally treated and sold as recycled motor oil. The quality was generally lower than virgin motor oil, and recycled motor oil gained a reputation for poor quality. The poor quality reputation began to change in the 1970s, when the API developed its objective quality standard for lubricating oils. As long as a lubricating oil can meet the stringent performance standards, its origin as rerefined or virgin is irrelevant, because any certified oil meeting the performance standards by definition meets the requirements of a high-quality product.

All rerefined motor oil available through the statewide DGS contract (Contract under development) meets the same stringent API standards that apply to virgin oils. If you have been reluctant to use rerefined motor oil because of its past reputation, try the newer, API-certified rerefined motor oils.

When using any type of motor oil, a little preventive maintenance can help keep your vehicles trouble-free. Here are a few motor oil tips:

- Change motor oil at the vehicle manufacturer's recommended change interval.
- Always use API-certified motor oil.
- Change the oil filter at the same time the oil is changed (if using a re-usable oil filter, be sure to clean the oil filter at the time of the oil change).

## AVAILABILITY



Rerefined oil is readily available through vendors listed in the statewide lube, oil and grease contract (Contract under development) through the DGS. Rerefined oil is generally not available in small amounts (such as quart bottles) at the retail level, but many oil jobbers throughout the state do carry rerefined oil in bulk amounts (55 gallon drums).

## **COST**

***Note: The following discussion on cost is general and is not meant to reflect specific contracts or to supersede existing mandates or policies.***

Rerefined oil is generally available at the same or lower cost than virgin oil. In some rural areas, the cost of rerefined oil may be slightly higher than virgin oil.

## **SPECIFICATIONS**

### **California**

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

### **Tips for Writing Specifications**

#### ***Sample Language***

When buying rerefined motor oil or other lubricating oils, include specifications which require the oil to be at least 70 percent rerefined base stock. Besides environmental and health benefits, your specifications can ultimately help lead to better prices and wider availability by increasing demand for rerefined oil. Here is a sample clause:

"All lubricating oils must contain at least 70 percent rerefined base stock. Vendors must certify that oils meet this recycled-content specification. Vendors must also certify that the motor oil is licensed by the American Petroleum Institute for their latest service category, conforms to respective viscosity grades, and is energy conserving as specified in this solicitation. Vendors are encouraged to provide products that contain a higher percentage of rerefined base stock than the 70 percent minimum."

#### ***Other Specifications***

- **United States Environmental Protection Agency (USEPA), [Database of Environmental Information for Products and Services](#).** This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services.
- **United States Federal Code:** Federal regulations state that rerefined oil is equivalent to new oil when meeting the API Standards. [\[6\]](#)

## **VENDORS**

### **Statewide Lube, Oil and Grease Contract**

Several brands of rerefined motor oil as well as other lubricating oils are available through the Statewide Lube, Oil and Grease contract (Contract under development) through the DGS.

[Local agencies](#) may use State procurement contracts.

## **Other Sources**

### **Oil Change Services for State Vehicles**

There are [State garages](#) and authorized vendors that offer rerefined oil for oil change services.

### **Recycled-Content Product Directory**

The California Integrated Waste Management Board's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

See also the [Resources and Web Sites](#) section.

## **SUCCESS STORIES**

### **State of California**

Each year, (based upon fiscal years 2000-01 - 2002-03 data), California State agencies purchase approximately 190,000 gallons of rerefined motor oil. Vehicles that use rerefined motor oil include Caltrans (California Department of Transportation) heavy equipment, passenger vehicles, and California Highway Patrol cruisers. [\[7\]](#)

### **United States Department of Defense (DOD)**

All branches of the United States Department of Defense Armed Forces have been approved to use rerefined motor oil in vehicles and military equipment. Military Specifications for motor oil clearly indicate that rerefined motor oil is considered equivalent in quality and performance to virgin oil, provided that the minimum performance requirements are met.

According to the Defense Supply Center Richmond, "Rerefined motor oil satisfies all manufacturers' engine warranties and meets the American Petroleum Institute (API) SJ and energy conserving performance classifications. The Society of Automotive Engineers (SAE) has approved the use of rerefined oil and the U.S. Army Tank-Automotive and Armaments Command (TACOM) has also qualified these engine oils under MIL-PRF-2104, for use in combat and tactical vehicles." [\[8\]](#)

### **California Cities of Thousand Oaks, Santa Monica, San Francisco, Chula Vista, and Sacramento**

The City of Thousand Oaks maintains a fleet totaling 450 vehicles and small equipment which uses rerefined motor oil. Vehicles and equipment running on re-rerefined motor oil include cars, trucks, compressed natural gas buses, generators, concrete saws, air compressors, etc. Since 1993, the city has used rerefined oil in all vehicles and has seen no engine failures or performance problems. "Rerefined oil is the only environmentally responsible oil that meets the same tough performance standards as other top brands while protecting our natural resources," said Mark D. Watkins, Public Works Director. [\[9\]](#)

The City and County of San Francisco is using rerefined oil in approximately 75 percent of their fleet vehicles. This includes all city departments except the Public Utilities Commission and the Police and Fire Departments. Soon the police department vehicles will also be serviced using rerefined oil, but not until a

low viscous oil can be provided. Additionally, 100 of the San Francisco Port vehicles are using rerefined oil. [\[10\]](#)

The City of Santa Monica has used rerefined oil in all of its fleet vehicles since 1999. [\[11\]](#) The cities of Chula Vista and Sacramento also use rerefined motor oil in their fleets. [\[12\]](#)

### **States of Minnesota and Vermont**

The State of Minnesota's Central Motor Pool now exclusively uses rerefined oil in its vehicles, while the State of Vermont has been satisfactorily using rerefined oil in all of its vehicles since 1994. [\[13\]](#)

### **King County, Washington**

King County in the State of Washington has been using rerefined oil in its fleets since 1992. According to its Environmental Purchasing Program, more than 150,000 gallons of rerefined oil were purchased in 2004 for its vehicle fleets. [\[14\]](#)

### **DaimlerChrysler**

DaimlerChrysler plants use quality, rerefined oils. These oils meet the same standards for performance and composition as their virgin counterparts. The Transmission Plant in Kokomo, Indiana, the Stamping Plant in Twinsburg, Ohio and the Engine Plant in Kenosha, Wisconsin have all instituted cost-saving programs that use rerefined oils. The program is expected to save the company around \$500,000 the first year and \$3 million the second year. [\[15\]](#)

## **RESOURCES AND WEBSITES**

### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA  
(916) 341-6000

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. Visit the CIWMB's [Rerefined Oil Web page](#) for information on the facts of rerefined oil, who uses rerefined oil and why, and a list of re-refiners, blenders, and distributors.

### **Defense Supply Center**

Richmond, Virginia  
(804) 279-4908

The Defense Supply Center supplies equipment and material to defense agencies. Their Web site contains information on rerefined oil pricing and specifications for use by military organizations.

### **King County Environmental Purchasing Program**

Seattle, WA  
(206) 296-0100  
(800) 325-6165

A pioneer and contemporary model in environmental procurement, King County provides sample contract specifications for environmentally preferable lubricants, including rerefined motor oil and vegetable-based

lubricants. In addition, its Web site contains procurement case studies including one on [rerefined oil](#), along with resources for environmental purchasing and waste reduction.

**Minnesota Pollution Control Agency (MPCA)**

St. Paul, MN  
(651) 296-6300  
(800) 657-3864

The MPCA provides assistance on the purchase of environmentally preferable products such as rerefined oil, latex paint, recycled-content paper, as well as resources, assistance, grants, and loans in the areas of waste and pollution prevention, recycling, reuse, environmental education, and sustainable communities.

**The Office of the Federal Environmental Executive (OFEE)**

Washington, DC  
(202) 564-1297

As part of its broader mission to promote sustainable environmental stewardship throughout the federal government, the OFEE promotes the acquisition of recycled-content, environmentally preferable, and biobased products. Visit the OFEE's Web site for sources of rerefined oil. Additionally, the Web site highlights success stories in environmental procurement, recycling, and waste prevention.

**United States Environmental Protection Agency (USEPA)**

Washington, DC  
(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a wide range of information about products such as rerefined oil. Visit the USEPA's [Comprehensive Procurement Guidelines \(CPG\) Web site](#) for Recovered Materials Advisory Notices (RMANs), which recommend recycled-content levels. The site includes a [rerefined lubricating oil page](#), a downloadable [vehicular products fact sheet](#) for 2004, a [CPG Supplier Database](#), and a [Database of Environmental Information for Products and Services](#).

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[1] California Integrated Waste Management Board, *Used Oil Recycling Rate Annual Report: 2003* (October 2004). See [www.ciwmb.ca.gov/UsedOil/RateInfo/](http://www.ciwmb.ca.gov/UsedOil/RateInfo/).

[2] Boughton, B. and A. Horvath, *Environmental Assessment of Used Oil Management Methods*, Environmental Science and Technology, Volume 38, No. 2, January 2004.

[3] Boughton and Horvath, *ibid*.

[4] "Consumers Look for the Products that Carry the API Quality Marks," *American Petroleum Institute* (March 11, 2003). Available at: <http://www.api.org/aboutoilgas/motoroil/>

[5] "DSCR's Re-refined Motor Oil Programs," United States Defense Supply Center Richmond (March 12, 2003). See <http://www.dscr.dla.mil/userweb/dscrlid/Re-refined/RR.htm>

[6] Title 16, Code of Federal Regulations, section 311.5.

[7] California Integrated Waste Management Board (CIWMB) State Agency Buy Recycled Campaign How Are We Doing? Web page (April 19, 2004). Available at: [www.ciwmb.ca.gov/BuyRecycled/StateAgency/Status.htm](http://www.ciwmb.ca.gov/BuyRecycled/StateAgency/Status.htm).

[8] "Defense Logistics Agency Offers Re-refined Motor Oil," *United States Environmental Protection Agency* (March 12, 2003). Available at: <http://www.epa.gov/oppt/epp/pubs/case/dlaoil.htm>.

[9] California Integrated Waste Management Board (CIWMB) Re-refined Oil "Street Smarts: The Users of Re-refined Oil" Web page (Available at: [www.ciwmb.ca.gov/UsedOil/Rerefined/Users.htm](http://www.ciwmb.ca.gov/UsedOil/Rerefined/Users.htm)), and CIWMB communication with Thousand Oaks staff during October 2005.

- [10] Cynthia Knowles, San Francisco Used Oil Recycling Coordinator. E-mail to CIWMB (October 28, 2005).
- [11] City of Santa Monica Environmental Programs Division Re-refined Oil Facts Web page. Available at [santa-monica.org/epd/residents/HHW/oil\\_refined.htm](http://santa-monica.org/epd/residents/HHW/oil_refined.htm).
- [12] California Integrated Waste Management Board Re-refined Oil "Street Smarts: The Users of Re-refined Oil" Web page. Available at [www.ciwmb.ca.gov/UsedOil/Rerefined/Users.htm](http://www.ciwmb.ca.gov/UsedOil/Rerefined/Users.htm).
- [13] Solid Waste Management Coordinating Board of Minnesota. *Environmentally Preferable Purchasing Guide*, Section 7.1. Available at: <http://www.rethinkrecycling.com/government/eppg/-buy-products-services/vehicles-and-related-products>.
- [14] King County Environmental Purchasing Program Environmentally Preferable Lubricants Web page. Available at: [http://www.kingcounty.gov/operations/procurement/Services/Environmental\\_Purchasing.aspx](http://www.kingcounty.gov/operations/procurement/Services/Environmental_Purchasing.aspx).
- [15] "Eco-Initiatives-Good ideas make a difference," *DaimlerChrysler* (March 11, 2003) See [www.daimlerchrysler.com/index\\_e.htm?environ/report2002/i\\_e.htm](http://www.daimlerchrysler.com/index_e.htm?environ/report2002/i_e.htm).

**Special Note:** Portions of the Environmentally Preferable Purchasing Best Practices Manual were borrowed or adapted from the [Environmentally Preferable Purchasing Guide](#) published by the Solid Waste Management Coordinating Board of Minnesota.

## Vehicles/Transportation – Antifreeze

### Environmental and Health Issues and Recommendations



#### Recycled Content:

Waste antifreeze can be recycled using your own equipment or a recycling service. This solves a waste disposal problem while providing a high-quality reformulated product to use in vehicles.



#### Prevents Waste:

Extended-life antifreeze is designed to last five years/150,000 miles or longer, which greatly reduces the need to purchase new and manage used antifreeze.

- Purchase, use, recycle, and reuse antifreeze in a continuous loop.

See the [Introduction](#) for a complete description of this environmental issue.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability and Vendors](#)
- [Cost](#)
- [Specifications](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Each day, Californians produce thousands of gallons of waste antifreeze (or "engine coolant"). Special rules apply to waste antifreeze, which is toxic, and precautions must be taken to ensure its proper "end-of-life" management. Some shops have solved this problem by buying their own recycling equipment or by using a service to recycle antifreeze. This practice not only solves the waste disposal problem but also provides usable reformulated antifreeze, eliminating the need to purchase more.

By switching their fleets to extended-life antifreeze, shops can greatly reduce their needs for both new product and waste management. Many newer cars and trucks, in fact, are now factory-filled with extended-life antifreeze.

## **Environmental and Health Issues**

Under [federal procurement guidelines](#), it is recommended that federal fleet managers establish a program for antifreeze recycling that consists of reclaiming spent antifreeze on-site or establishing a service contract for recycling it off-site. On-site recycling provides you with a new product to replace your old product, eliminating the waste disposal problem and avoiding unnecessary purchases.

California law restricts disposal of used antifreeze in landfills, through storm drains, and into sewage systems. Check with your hazardous waste permitting agency and your sewer regulatory agency for details on restrictions. Also, antifreeze should never be put into a septic system as it destroys the bacteria needed to make the system work.

## **RECYCLED-CONTENT**

California alone recycles about 8.5 million gallons of antifreeze a year. Out of this amount, 35 percent by weight is both propylene and ethylene glycol. [\[1\]](#) This tremendous amount of recycled antifreeze is available from the various recycling companies throughout California.

Extended-life antifreeze can also be recycled. However, the on-site treatment systems that have been established for regular antifreeze will not work with the extended-life coolants. If businesses want to continue with the recycling process for this product, they will need to upgrade their equipment.

## **LAWS AND GUIDELINES**

### **California**

#### **Statutes**

#### **State Agency Buy Recycled Campaign (SABRC)**

- Recycled-Content Product Procurement Requirements
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on antifreeze be spent on antifreeze with at least 70 percent postconsumer content.
  - The SABRC antifreeze (AF) product category covers antifreeze, including recycled antifreeze, and antifreeze containing a bittering agent or made from polypropylene or another similar nontoxic substance. (See [PCC section 12207](#).)
- Recycled-Content Certification Requirements



- [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- Recycled-Content Product Procurement Report
  - [PCC 12211](#) requires antifreeze (AF) purchases to be reported in each agency's annual [SABRC Procurement Report](#).
- Recycled-Content Product Procurement Contract Language
  - [PCC section 12217\(f\)](#) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

#### Other

- [Business and Professions Code \(BPC\) sections 13710 and 13711](#) require antifreeze to meet the American Society for Testing and Materials (ASTM) D15 Engine Coolants standards.
- [BPC section 17582](#) requires all antifreeze sold after July 1, 2003 to include denatonium benzoate at a minimum of 30 parts per million as a bittering agent to ensure neither animals nor children will swallow it.
- [Health and Safety Code \(HSC\) 25218.1](#) lists antifreeze as a household hazardous waste, thus it is considered a [Universal Waste](#), a product that can not be disposed in landfills or sewage systems.

#### Federal

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the Comprehensive Procurement Guidelines (CPG), and engine coolants are CPG-designated items. Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. [2] Recommended recovered materials content ranges for engine coolants are available on the [USEPA's Web site](#).

Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products.

#### PERFORMANCE

##### Recycled Antifreeze

The [ASTM](#) and the [Society of Automotive Engineers](#) (SAE - Paper Number 921634) have extensive testing that indicates when properly formulated, recycled coolants meet or exceed nationally recognized performance specifications from the ASTM.

According to federal [EPA guidelines](#), recycled antifreeze might actually be purer than virgin products because the recycling process reduces chloride content in the product. [3]

Auto makers are embracing recycled coolants. One major auto maker endorses several coolant recycling systems; it also stipulates that the engine warranty will be unaffected if engine coolant recycling is performed as described by the manufacturer and with approved recycling equipment. Most manufacturers authorize the use of certain engine coolant recycling processes and chemicals that meet their specifications. Check with your vehicle manufacturer or dealer to see which coolant recycling equipment or process is appropriate.

### **Extended-Life Antifreeze**

The service life of antifreeze is limited by the protection ability of the corrosion inhibitors. Extended-life coolants have been shown to retain over 95 percent of their corrosion inhibitors after five years/150,000 miles in automobiles. In addition, most extended-life coolants do not contain silicates and phosphates - common in conventional antifreeze - which tend to be abrasive to water pump seals.

## **AVAILABILITY AND VENDORS**

### **Recycling Your Antifreeze**

On-site and off-site recycling are two choices available for managing used and acquiring recycled antifreeze. On-site recycling equipment can be leased or purchased through several California distributors. For a list of California companies that provide recycling services, see the California Integrated Waste Management Board's (CIWMB) [Household Hazardous Waste Web site](#); for equipment and supplies, please peruse the California Department of Toxic Substances Control's (DTSC) Vehicle Service and Repair Program Equipment and Supplies Directory.

### **Purchasing Your Antifreeze**

Recycled-content antifreeze can be purchased throughout California through distributors that recycle it. Vendors of both regular and extended-life recycled-content antifreeze can be found in the CIWMB's [Recycled-Content Product Directory](#).

### **Extended-Life Antifreeze**

Extended-life antifreeze has been offered as standard coolant fill since 1996 in virtually all new cars and light duty trucks by one of the major automotive manufacturers. Other automotive manufacturers use extended-life antifreeze in some of their new vehicles, and most medium-duty and heavy-duty truck builders offer extended-life coolants as an option in new trucks. Extended-life antifreeze is widely available in California primarily through truck and automotive fuel and fluid distributors.

## **COST**

When evaluating which service choice is best for your shop, consider these costs:

- Purchasing virgin antifreeze compared to recycled and extended-life (five year/150,000 mile);
- Shipping used antifreeze off-site for recycling;
- Buying or leasing on-site recycling equipment and replacement filters;
- Contracting with a service to recycle used antifreeze on-site and reformulate the recycled product;
- Labor to use and maintain on-site recycling equipment; and
- Disposal costs related to the waste from recycling.

### **Recycled Antifreeze**

Depending on your volume, the cost of using an on-site recycling service, or using your own equipment to recycle your antifreeze, should be cheaper than purchasing virgin product and hiring a separate service to handle the used antifreeze. Some shops prefer to use an off-site recycling service; they buy back recycled antifreeze from the same company. This approach saves money compared to disposal of used

and purchase of new antifreeze. Disposal without buying back recycled antifreeze is the most expensive choice.

### **Extended-Life Antifreeze**

Although the initial cost of extended-life is higher than conventional antifreeze, the extra cost is insignificant because the antifreeze may never have to be changed. Many extended-life coolants are designed to last the life of the vehicle, saving labor costs that would otherwise occur to flush and fill the cooling system with conventional product. Extended-life antifreeze also decreases or eliminates the costs of managing used antifreeze.

### **SPECIFICATIONS**

Whether you recycle your own antifreeze or use a service, the recycled product should include the addition of chemicals to recondition the antifreeze. Check with the manufacturer to see which type of recycled product is appropriate for each vehicle.

- If you are converting your fleet to extended-life antifreeze, contact your equipment dealer or the engine manufacturer to see which extended-life product is best for each vehicle. All coolants should meet the ASTM D15 Engine Coolants standards for gasoline or diesel service engines.

### **SUCCESS STORIES**

#### **State of California**

DTSC's Pollution Prevention Program has a Web site about its [Vehicle Service and Repair Program](#). This site not only has testimonials about pollution prevention but also has tips and training information to provide to machine shop keepers. A full listing of those shops that are certified through the Vehicle Service and Repair Program are listed on the [DTSC's Web site](#).

#### **State of Minnesota**

The [Minnesota Pollution Control Agency](#) (MPCA) is a state agency that provides information, assistance, grants, and loans in the areas of waste, pollution prevention, recycling, reuse, and environmental education. Their Web site hosts the [Minnesota Recycled Products Directory](#), which lists local businesses that sell recycled antifreeze. The downloadable [2006 Pollution Prevention Summary Report](#) discusses the experience of ten agencies and institutions with antifreeze.

#### **United States Military**

During 1997, Fort Irwin's antifreeze recycling program reclaimed 11,970 gallons of antifreeze, leading to a total cost savings in excess of \$48,000. Read the complete success story on the United States Army Environmental Center's Web site.

Additional environmentally preferable antifreeze success stories are available on the Green Base of the Future Web site (click on "Logistics").

### **RESOURCES AND WEBSITES**

### [California Department of Toxic Substances Control \(DTSC\)](#)

The DTSC's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. Approximately 1,000 scientists, engineers and specialized support staff work in [nine locations](#) statewide. See DTSC's [Vehicle Service and Repair Program Web pages](#).

### [California Integrated Waste Management Board \(CIWMB\)](#)

Sacramento, CA

(916) 341-6000

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

- **Buy Recycled Resources**  
To locate other State agencies and various City, County and private organizations that use, sell or recycle their recycled-content antifreeze, please view the [Buy Recycled Resources pages](#).
- [Household Hazardous Waste Publications](#) are available on-line.
- **Recycled-Content Product Directory**  
The CIWMB's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

### [United States Environmental Protection Agency \(USEPA\)](#)

Washington, DC

(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products such as recycled antifreeze and other vehicular products. Visit the USEPA's [Comprehensive Procurement Guidelines Web site](#) for its Recycled Material Advisory Notices (RMAN), which recommend recycled-content levels. The site offers an [Engine Coolants page](#), a downloadable product fact sheet for 2004, a [CPG Supplier Database](#), and a [Database of Environmental Information for Products and Services](#).

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[1] From October 2005 Department of Toxic Substances Control staff communication with antifreeze recycler.

[2] United States Environmental Protection Agency, *2004 Comprehensive Procurement Guidelines Buy-Recycled Series Vehicular Products Fact Sheet*. Available at [www.epa.gov/cpg/pdf/vehicle.pdf](http://www.epa.gov/cpg/pdf/vehicle.pdf).

[3] Ibid

**Special Note:** Portions of the Environmentally Preferable Purchasing Best Practices Manual were borrowed or adapted from the [Environmentally Preferable Purchasing Guide](#) published by the Solid Waste Management Coordinating Board of Minnesota

## **Vehicles/Transportation - Parts Washing**

### **Environmental and Health Issues and Recommendations**



#### **Prevents Waste:**

Parts washing equipment with cleaning and filtering stages keeps solvent cleaner longer, resulting in less solvent being disposed.



#### **Less Hazardous:**

Some shops have switched from ignitable parts cleaners to those with higher flashpoints in order to reduce the hazards of storing and using cleaners and disposing of waste.



#### **Air Quality -- Low Volatile Organic Compounds (VOCs):**

Several shops have switched to aqueous- (water-) based cleaners that do not contain VOCs. This reduces exposure risks to workers and is better for the environment.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

In the course of routine cleaning, many shops use parts washing systems for engines and other equipment parts. Parts washing systems include standard recirculating parts washers, distillation units, and those with multiple filters. In choosing the right parts cleaning system, a department should evaluate both the equipment and the cleaning solvent it uses, as well as the type of parts to be cleaned.

Start by determining your needs. The right choice will be a combination of system and cleaner that is safe, effective, and convenient while minimizing unnecessary costs. With parts washing services, seek out an appropriate level or frequency of service; also important are its record-keeping and management services that assure regulatory compliance.

Whether water-based (aqueous) or petroleum-based, cleaning solvents present their own environmental concerns. Along with the waste produced during usage, cleaners may pose exposure risks to employees. In most instances, shops must manage wastes produced during parts cleaning as hazardous.

By investigating regulations first, the State can avoid costly testing and compliance problems later. Failure to gain the necessary approvals prior to disposal of parts cleaning wastes can result in enforcement action and other liabilities.

## **LAWS AND GUIDELINES**

The laws and regulations that apply to parts cleaning wastes include California Hazardous Waste regulations, California statutes, and federal regulations.

Before deciding on a parts washing system, know the regulatory advantages and disadvantages of each type. Whether aqueous- or petroleum-based, waste parts washer solvent must be managed as hazardous waste - unless an evaluation determines that the waste is non-hazardous. Waste evaluations may consist of knowledge regarding the chemical ingredients in the cleaner and the contaminants introduced to the cleaning solutions during cleaning; sometimes, additional testing may be necessary. If your parts cleaner service or supplier does not address regulatory concerns that apply to your parts washer, consult with your hazardous waste regulatory program for assistance.

- Contact the [California Department of Toxic Substances Control](#) (DTSC) for information on [managing hazardous waste](#) and [preventing pollution](#).
- Consult the California Air Quality Management Districts (AQMD) and the Air Pollution Control Districts (APCD) directory [Web site](#) to ascertain any prohibitions for the use of solvents for parts cleaning.
- Information on federal requirements is available from [FedCenter.gov](#).

## PERFORMANCE

There are several different parts washing systems. Based on the type of parts that are routinely cleaned as well as the type and amount of grime on the parts, determine which system is best for your shop.

First, decide whether you need a parts washer. Some small repair shops have eliminated the need for their parts washers. They directly apply small amounts of cleaners to parts and then wipe them clean with rags instead. The rags are later laundered and reused.

If you need a parts washer, decide what parts washing system and solvent you will require. Types range from standard recirculating parts washers and distillation units to units with multiple filters. Additional consideration should be given to the size of the parts to be cleaned, the dirtiness of the parts, and the frequency with which the system will be used.

After identifying a parts washing system, choose a cleaning solvent. Solvents are either aqueous- or petroleum-based.

### Aqueous-based solvents

These water-based solvents are usually less hazardous to the user than their petroleum-based counterparts. They clean by using a surfactant (such as soap or detergent), a corrosive or alkaline ingredient, or another type of chemical to remove soil from parts. Unlike those of 10 to 15 years ago, most aqueous solutions today are pH neutral.

Although water-based cleaners are often touted as being "non-hazardous", "sewer-able", or "environmentally friendly", they must be managed as a hazardous waste unless the waste has been evaluated and found not to exhibit hazardous characteristics. It is important for users of parts washers to understand that the solvent is water-based and that no other fluids except greases and oils are added.

### Petroleum-based cleaners



Many areas in California now ban the use of VOC solvents. See your local [air district's](#) rules. Most petroleum-based systems use mineral spirits, Stoddard, or similar petroleum-based solvents. Exposure to concentrated vapors from these solvents can cause breathing problems and headaches. These solvents are also ignitable. Cleaners with higher flashpoints (>140°F) are available to reduce the risk of ignition. Shops using petroleum-based cleaners must take extra precautions when using and storing the product and managing the wastes.

## AVAILABILITY

There are many different kinds of equipment, cleaners, and services, including simple "sink-on-a-drum" equipment and spray cabinets. Cleaners are available through vendor representatives. Parts cleaner collection and disposal services are available statewide.

## COST

### Parts Cleaner Services

Service costs vary according to equipment type and service level required. Disposal of used cleaner is included in the equipment-servicing contract.

Some parts washers, such as those with filters and skimmers, extend the bath life of the cleaner so that it is less expensive to utilize. This saves money on original setup and frequency.

Shops that can purchase their own parts washers and dispose of the solution through their hazardous waste disposal contracts may achieve higher cost savings over a more convenient service contract. See the DTSC document titled [Case Studies in Aqueous Parts Cleaning](#).

### Aqueous-Based Cleaners

Although aqueous cleaners cost more per gallon than petroleum-based cleaners, they generally last 25 percent to 50 percent longer. Aqueous cleaners can therefore reduce waste production. Because they must be heated in order to be effective, electricity costs are higher than with petroleum-based cleaners. See the DTSC's fact sheets.

## SPECIFICATIONS

Specifications for parts cleaning equipment, cleaners, and services vary depending on the types of parts you are cleaning, amount and type of grime you are trying to remove, and the volume. See the [Performance](#) section. When writing specifications for a parts washer, include a preference for equipment with two-stage cleaning and a recirculating feature with built-in filtration to continuously remove dirt and contaminants. If you are purchasing equipment that utilizes aqueous-based cleaners, also include a preference for equipment with a skimmer to remove oils and other floating contaminants.

## VENDORS

### California Department of Transportation (Caltrans) Contract

The [Caltrans Division of Equipment](#) has three regional service contracts: 32A0087, 32A0088 and 32A0089 with Safety-Kleen Systems -- for supplying and maintaining automatic parts washers that use aqueous-based less-toxic cleaners. This contract is only available for use by Caltrans; however, it can be used as a model by others. The term of the agreement is June 1, 2007 through May 31, 2010.

### **Other Vendors**

To find equipment manufacturers and distributors, conduct an Internet search using the words "parts washers."

## **SUCCESS STORIES**

### **California Local Agencies**

Each of the local agency operations featured in the DTSC document titled [Case Studies in Aqueous Parts Cleaning](#) successfully switched from solvent to aqueous (water-based) parts cleaning, or from one brand of aqueous cleaner to another. These case studies, which are based upon studies conducted between 1997 and 1999, prove that aqueous cleaners are capable of meeting or exceeding the many parts cleaning challenges encountered in a wide variety of fleet maintenance operations.

#### **Anoka County, Minnesota**

In 1998, the Anoka County Highway Department switched one of two parts washers to an aqueous-based system. In the other solvent-based parts washer, the department began using a solvent with a higher flash point. Besides increasing worker safety, these changes resulted in a 50 percent reduction in the amount of solvent requiring disposal as hazardous waste.

## **RESOURCES AND WEBSITES**

### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA  
(916) 341-6000

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. See the Waste Prevention Information Exchange Automotive Waste Prevention Web page.

### **California Department of Toxic Substances Control (DTSC)**

Pollution Prevention - Vehicle Service and Repair Program  
(800) 700-5854

The goal of the DTSC's [Vehicle Service and Repair Industry Pollution Prevention Program](#) is to reduce environmental and health impacts of vehicle repair and maintenance operations in California.

### **National Pollution Prevention Roundtable**

Washington, DC  
(202) 299-9701

The National Pollution Prevention Roundtable (Roundtable), a 501(c)(3) nonprofit organization, is the largest membership organization in the United States devoted solely to pollution prevention. The mission of the Roundtable is to provide a national forum for promoting the development, implementation, and evaluation of efforts to avoid, eliminate, or reduce pollution at the source.

**United States Environmental Protection Agency (USEPA), Region 9**

Environmental Information Center  
San Francisco, CA  
(866) EPA-WEST

Region 9 of the USEPA provides [executive summaries](#) of studies of water-based parts washing systems.

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**Caltrans Parts Washing Service Contract**

[Agreement 32A0040 Summary STD 215](#)

[Bid Proposal](#)

[Agreement 32A0040 STD 213](#)

[Appendix A to Agreement 32A0040](#)

**Special Note:** Portions of the Environmentally Preferable Purchasing Best Practices Manual were borrowed or adapted from the [Environmentally Preferable Purchasing Guide](#) published by the Solid Waste Management Coordinating Board of Minnesota.

## **Vehicles/Transportation - Retreaded Tires**

### **Environmental and Health Issues and Recommendations**



#### **Prevents Waste:**

Using retreaded tires conserves a valuable nonrenewable resource - oil. Each year, retreading tires saves more than 400 million gallons of oil in North America. While it takes 22 gallons of oil to make a new tire, retreading a truck tire only uses seven gallons of oil. Retreaded tires can also help divert thousands of scrap tires from disposal each year. [\[1\]](#)

- Retread tires whenever appropriate and feasible.
- Purchase retreaded tires for tires that are 16 inches or greater.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Retreading Process](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)

- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Retreaded tires are safe, dependable, and cost less than comparable new tires. Retreaded tires are safely used on the drive wheels of school buses, fire trucks, ambulances, and other emergency vehicles. In addition, approximately 80 percent of all aircraft tires in service in the United States are retreaded.[2] According to the United States Environmental Protection Agency (USEPA), retreaded tires are successfully used on Air Force One.[3] In North America, the trucking industry saves more than three billion dollars annually by using retreaded tires.[4]

When vehicle tires become worn, the tire casing can be reused with new tread. The [retreading process](#) bonds new tread to the tire body using a process similar to the manufacturing process of new tires.

Both new and retreaded tires can fail. According to a study conducted by the Arizona Department of Transportation, the most common causes of tire failures in all types of tires - this includes new and retreaded tires - are under-inflation and damage due to roadway hazards and debris.[5]

### ***Environmental and Health Issues***

California is faced with the challenge of safely managing 39 million reusable and waste tires generated annually in the state. In addition, an estimated 1.5 million tires are in unpermitted stockpiles throughout the state. Unfortunately, the number of waste tires generated annually continues to exceed the number of tires diverted. In 2003, 28.5 million of the 39 million tires generated were diverted from stockpiling or disposal, and the remaining 10.5 million waste tires generated were disposed of at landfills and mono-fills.[6]

Stockpiled tires present a potential fire hazard that could threaten natural resources by polluting air, soil, and water. In addition, since tires burn very hot and are difficult to extinguish, they may pose a safety hazard for fire personnel and others in the area. Tires also make an excellent breeding ground for disease-carrying mosquitoes that can transmit the West Nile virus [7],[8] and two strains of encephalitis - Lacrosse and western equine.[9]

Using retreaded tires conserves a valuable nonrenewable resource - oil. Each year, retreading tires saves more than 400 million gallons of oil in North America. Retreading a truck tire uses seven gallons of oil, while 22 gallons of oil are used to make a new tire.[10]

## RETREADING PROCESS

According to the Tire Retread Information Bureau, there are two systems used to retread a tire - Pre Cure and Mold Cure.[11] Both systems produce equally good retreaded tires that can conform to federal standards.

The initial steps, 1 and 2, are the same for the two systems. The steps are:

1. Primary Inspection. Each tire is subjected to a visual inspection. Only the best proven worn tires pass this inspection;
2. Buffing. After inspection, tires have the old tread mechanically removed on high speed buffers. Today's buffers will remove the proper amount of old rubber while turning the tire to an exact specified diameter and radius;
3. Application of new rubber in the tread area.
  - a. Pre Cure System. The tread rubber has already been vulcanized with the new tread design. A thin layer of cushion gum is wrapped around the tread and the pre cured tread is then applied. The cushion gum serves to bond the pre cured tread to the tire. The tire

is then placed in a curing chamber and the pre cured tread becomes adhered to the tire through a vulcanizing process very similar to that used in new tire construction.

- b. **Mold Cure System.** Unvulcanized tread rubber is applied to the buffed tire. The tire is then placed into a rigid mold which contains the tread design in the tread area. The mold is heated and the rubber in the tread area vulcanizes and adheres to the tire with the new tread design molded in. This vulcanization process is also similar to that used in new tire construction.

Both systems require a combination of time, heat, and pressure to create the vulcanization of the new rubber to the tread area of the tire;

4. **Final Inspection.** The final inspection ensures that only tires meeting quality standards are used;
5. **Trimming and Painting.** A retreaded tire that passes final inspection is trimmed to remove excess rubber and painted. It is then ready for use and future additional retreading as long as it is safe.

If needed, nail hole and section repairs can be performed.<sup>[12]</sup> Organizations with a large turnover in tires could probably benefit from using a regular tire retreading service.

## **LAWS AND GUIDELINES**

### **California**

#### **Statute and Regulations**

##### **State Agency Buy Recycled Campaign (SABRC)**

- **Recycled-Content Product Procurement Requirements**
  - [Public Contract Code \(PCC\) section 12203](#) requires State agencies (including California State Universities) to ensure that at least 50 percent of the dollars spent on tires be spent on retreaded tires that use an existing casing that has undergone an approved or accepted recapping or retreading process, in accordance [Public Resources Code section 42401](#). (See also [PCC section 12207](#).)
- **Recycled-Content Certification Requirements**
  - [PCC section 12205](#) requires all State agencies to obtain from all suppliers written certification of the postconsumer recycled content of each product offered or sold to the State. Recycled-content certification forms are available in the [SABRC training manual](#).
- **Recycled-Content Product Procurement Report**
  - [PCC 12211](#) requires tire purchases to be reported in each agency's annual [SABRC Procurement](#) Report.
- **Recycled-Content Product Procurement Contract Language**
  - [PCC section 12217](#)(f) directs State agencies to remove contract provisions that impede the consideration of recycled products and to replace them with performance standards.

##### **Tire Condition and Use**

[California Code of Regulations](#) (CCR), Title 13, section 1087

(c) **Recapped Tires.** Tires recapped or retreaded for highway use shall have a tread pattern that complies with [Section 27465 of the Vehicle Code](#) and with this section. Recapped or retreaded tires shall not be used on front wheels of a bus or farm labor vehicle. Such tires shall not be used on the front wheels of truck tractors or motortrucks listed in [Vehicle Code Section 34500](#) unless the tires are in compliance with the following requirements:

- (1) Tires shall have been retreaded or recapped not more than two times and shall contain no casing repair other than that required by a nail puncture.
- (2) Tires shall conform to either the labeling and other requirements of the 1972 CRSC [California Retreading Standards Committee] Retreading Specifications and Standards or to the Industry Standards For Tire Retreading & Repairing revised September 1, 1995. Tires retreaded on or after November 1, 1997, shall conform to the Industry Standards For Tire Retreading & Repairing revised September 1, 1995.

(3) A new-tire manufacturer who is assigned an identification number by the U.S. Department of Transportation (DOT) may certify adherence to standards equal to or better than CRSC standards (only until November 1, 1997), or the Industry Standards For Retreading & Repairing revised September 1, 1995 for retreaded tires produced in his/her company-owned-and-operated retreading facilities. Such certification shall comply with marking or labeling requirements of CRSC (only until November 1, 1997), or the Industry Standards for Tire Retreading & Repairing revised September 1, 1995, except that the certification mark branded into the tire may be of original design. A certification mark of original design shall show the name or trademark and assigned DOT registration number of the manufacturer and designate which of his/her retreading facilities produced the tire.

(4) Successive Retreads. When a retreaded tire bearing the markings specified in preceding subsections is retreaded a second time, the prescribed label shall be cancelled by a diagonal line or other distinctive mark through the label.

(d) Tires on Dual Wheels. The outside diameters of tires used on dual wheels shall be so matched that on a level roadway each tire will contact the surface at all times.

### **Federal**

- The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the USEPA in the [Comprehensive Procurement Guidelines](#) (CPG). Retreaded tires are USEPA-designated items. "Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable." [\[13\]](#) This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [\[14\],\[15\]](#) The USEPA [recommends](#) that agencies procure tire retreading services and procure tires through competition between vendors of new tires and vendors of retreaded tires.

Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products. [\[16\]](#)

- [Code of Federal Regulations \(CFR\)](#)  
[49CFR393.75\(d\), revised 2005](#), prohibits buses from operating with regrooved, recapped or retreaded tires on the front wheels.

[49CFR571.117, revised 2004](#), establishes standard performance, labeling, and certification requirements for retreaded pneumatic passenger car tires similar to the safety standards for new tires.

[49CFR571.120, revised 2003](#), authorizes retreaded tires to be used on motor vehicles with a gross vehicle weight rating of more than 10,000 pounds (4,536 kilograms) provided the tires were originally manufactured to comply with standard number 119, established under [49CFR571.119, revised 2004](#).

[49CFR571.139, revised 2004](#), specifies standards for tire dimension, test requirements, labeling requirements, and defines tire load ratings to be used with new and retreaded tires for light vehicles that have a gross vehicle weight rating of 10,000 pounds (4,536 kilograms) or less that were manufactured after 1975.

### **PERFORMANCE**

According to the Federal Safety Standards developed by the United States Department of Transportation, retreaded tires can be driven at the same speeds as new tires with no loss in safety or comfort. And with proper maintenance and care, they deliver about the same mileage as new tires. [\[17\]](#)

The United States Army Tank-Automotive and Armaments Command (TACOM) maintains a list of manufacturers and brands of retreaded tires currently approved by TACOM that have passed qualification testing and/or technical reviews to certain [American Society for Testing and Materials \(ASTM\) standards](#).



At this time, only tires 16 inches and larger are known to be available that pass all applicable standards and specifications for retreaded tires .[\[18\]](#)

According to the USEPA, it is a myth that retreaded tires have a higher failure rate than new tires. "Rubber on the road comes from both new tires and retreaded tires, primarily from truck tires that are overloaded, underinflated, or otherwise abused. New or retreaded tire failures can be greatly reduced by following all the rules of good maintenance, including proper mating with regard to diameter and tread depth and design, and maintaining proper air pressure." Properly maintained tires, both new and retreaded do not cause accidents.[\[19\]](#)

***Common causes of tire failures in all types of tires include:***

**Punctures**

Punctures are an unavoidable problem that affects both new and retreaded tires; however regular tire inspections and routine maintenance can lessen the impact of this hazard;

**Under-inflation**

All tires have a tendency to lose air over a period of time. Thus, under-inflation "creates excess tire drag, increasing friction between the tire and the road surface. This generates greater amounts of heat, which speeds tread wear and weakens tire components, thereby decreasing the usable life of the tire and rendering it prone to failure." Under-inflated tires can also cause weight distribution problems." An under-inflated tire in a dual position doesn't carry its full share of the load. This in turn, affects chassis loading, traction, steering, alignment and breaking. It may also cause noticeable steering pull when driving or braking";

**Over-inflation**

Over-inflated tires become rigid and the capacity for absorption of sudden shocks on the road is reduced. As a result, over-inflated tires are more susceptible to tears, punctures, and breaks;

**Excessive loading**

Exceeding a tire's load capacity can increase tread wear, reduce sidewall resilience, and decrease fuel economy;

**Driver error**

Driver errors include poor maneuvering and operating practices. Drivers have the tendency to allow tires to either hit or roll over curbs. This practice may dent rims, cause blow outs, belt separation, and air loss; and

**Axle alignment and other conditions**

If the axle isn't aligned properly it can cause increased wear on the outside or inside shoulders of the tires. Mismatched tires will cause the larger tire to carry most of the load and the smaller tire will wear irregularly and quicker.[\[20\]](#)

***Helpful hints***

- Use steel sidewall casings.
- Check the vendors' facility to ensure their operations and process of retreading tires are acceptable.
- Retread the same brand tires to your new tires because not all tires have the same rolling radius. This is especially true on four-wheel-drive units.

**AVAILABILITY**

In North America, 18 million retreaded tires were sold during 2004 resulting in sales of more than \$3 billion.[\[21\]](#) An estimated 757,000 retreads were sold in 2003 by plants in California.[\[22\]](#) However, at this

time, only tires 16 inches and larger are known to be available that pass all applicable standards and specifications for retreaded tires.[\[23\]](#)

## **COST**

***Note: The following discussion on cost is general and is not meant to reflect specific contracts or to supersede existing mandates or policies.***

Many tires can be retreaded more than once; therefore, agencies can avoid the disposal costs of the tires. Retreaded tires are typically 30 percent to 50 percent less expensive than new tires. For example, the average price of a retreaded tire for a light truck is \$60, while the price of a new tire of the same size can reach \$100 or more .[\[24\]](#)

The California Integrated Waste Management Board's (CIWMB) [Tire Recycling Market Guide](#) also compares price differences between retreaded and new tires. This research also concludes that retreaded tires cost less than new tires.

## **SPECIFICATIONS**

### **California**

#### **Tips for Writing Specifications**

Specify that retreaded tires shall meet all performance and quality standards specified in the Federal Motor Vehicle Safety Standards determined by the [United States Department of Transportation](#) and the [California Code of Regulations](#) (CCR), Title 13, section 1087.

#### **Other Specifications**

##### **Federal**

The USEPA recommends that procuring agencies:

- Specify that tire repair and retread services must conform to Federal Specification ZZ-T-441H (or current version); and
- Specify that retread tires must meet the requirements of Federal Specification ZZ-T-381, "Tires, Pneumatic, Vehicular (Highway) (New and Retreaded)."[\[25\]](#)

Retreaded tires specifications are available in the USEPA's database of Environmental Information for Products and Services under [fleet maintenance](#); under the [contract and policy language](#) you will find recommended guidelines developed by a contractor for the USEPA and the State of Ohio's specifications. The recommended guidelines are also available on the Tire Retread Information Bureau's Web site.

## **VENDORS**

Check to see if your distributor carries or can obtain retreaded tires. Vendors can be found on the following list servers or databases.

#### **Recycled-Content Product Directory**

The California Integrated Waste Management Board's [Recycled-Content Product Directory](#) contains thousands of listings of recycled-content products from thousands of suppliers.

#### **Comprehensive Procurement Guidelines**

The USEPA's list of designated products and the accompanying recycled-content recommendations provides recycled-content product information and two sources of vendors. One source is the [Comprehensive Procurement Guidelines Supplier Database](#) that identifies manufacturers and suppliers of

retreaded tires. The second source is [GSA Advantage](#) that lists products available through the Federal Supply Service.

#### **Tire Retread Information Bureau**

The [Tire Retread Information Bureau](#) maintains the [Retread Tire Buyers Guide](#), which lists vendors and the types of retreaded tires they sell.

### **SUCCESS STORIES**

#### ***California***

##### **California State Parks**

In 2001, California State Parks conducted a pilot program testing retreaded tires in three equipment vehicles. During this pilot program, California State Parks did not experience any problems or abnormal wear. California State Parks did not find any reason to not continue using retreaded tires.

##### **California Department of Transportation**

In 1997, the Department of Transportation, Equipment Service Center developed the following policy on retreaded tires:

- All passenger vehicle tires 16" and below will not be retreaded;
- Light truck tires 16" and above, all heavy truck, and construction equipment tires will be retreaded;
- Trailer tires, including heavy duty design (e.g., low-boy trailers) will be retreaded;
- Light and heavy truck retread tire applications will be limited to drive axles only. Steering axles will use new tires only;
- Construction equipment (e.g., graders, loaders, etc.) will use retreaded tires on all wheels, including steering axles;
- Tire carcasses will be retreaded a maximum of two times; and
- "Certified" retreads will not be used.

##### **City of Santa Monica, CA**

The City of Santa Monica has been using retreaded tires for more than 20 years. According to the City, its entire fleet, consisting of 585 vehicles, uses retreaded tires. (As of December 2005) [\[26\]](#)

##### **City of Davis, CA**

The City of Davis has purchased retreaded truck tires of 10R22.5 and larger since 1993. These tires are installed on the rear axle only, not the front axle. The city installs them on all city trucks including fire trucks. The city even attempted to utilize retreaded light truck tires for pickups and other small trucks, but had numerous failures due to retreading low quality tire casings. Therefore, the city no longer uses retreaded tires on light trucks (As of January 2006).

##### **Other Users**

The Northwest District of the Minnesota Department of Transportation has been using retreaded tires on its maintenance trucks. Retreads are used on the rear wheels of 75 snowplow trucks, as well as on loaders and mower tractors. The District is satisfied with the product and it saves money in comparison with buying new tires. [\[27\]](#)

Other users of retreaded tires include (As of 2005):

Air Force One

United States Postal Service

United States Department of the Interior

Wright-Patterson Air Force Base

United States Department of Defense  
Massachusetts

## RESOURCES AND WEBSITES

### **California Integrated Waste Management Board (CIWMB)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians. The CIWMB maintains a [Tire Management Web site](#).

### **Federal Motor Carrier Safety Administration**

Washington, DC  
(800) 832-5660

The Federal Motor Carrier Safety Administration, which is under the United States Department of Transportation, establishes safe operating standards and requirements for commercial vehicle drivers, carriers, vehicles, and vehicle equipment.

### **Minnesota Pollution Control Agency (MPCA)**

St. Paul, MN  
(651) 296-6300  
(800) 657-3864

The MPCA is a state agency that provides information and assistance on pollution prevention practices to ensure compliance with state and federal regulations involving air quality, surface and groundwater, and solid and hazardous waste. The MPCA maintains fact sheets on properly managing a variety of wastes. For more information on managing tire waste, see the "[Managing Waste Tires](#)" fact sheet.

### **Rubber Manufacturers Association (RMA)**

Washington, DC  
(202) 682-4800

The RMA is the national trade association for the rubber products industry. Its members include more than 100 companies that manufacture various rubber products, including tires, hoses, belts, seals, molded goods, and other finished rubber products.

### **Solid Waste Management Coordinating Board of Minnesota (SWMCB)**

The SWMCB distributes resource materials on a variety of waste issues for residents, businesses, nonprofit organizations and government organizations. In particular, "[The Environmentally Preferable Purchasing Guide](#)" provides government purchasers with information on purchasing environmentally preferable products. Over thirty types of products are addressed in the Guide. Information about environmental and health issues, cost, availability, performance and specifications for each product is provided. [Section 7.4](#) addresses retreaded tires.

### **Tire Industry Association (TIA)**

Bowie, MD  
(800) 876-8372

The TIA is an international association representing all segments of the tire industry, including those that manufacture, repair, recycle, sell, service or use new or retreaded tires, and also those suppliers or individuals who furnish equipment, material or services to the industry. The TIA was formed by the July 2002 merger of the International Tire & Rubber Association (ITRA) and the Tire Association of North America (TANA).

**United States Environmental Protection Agency (USEPA)**

Washington, DC

(202) 272-0167

In order to assist federal agencies in purchasing environmentally preferable products and services, the USEPA offers a range of information about products such as retread tires. Visit the USEPA's [Comprehensive Procurement Guidelines](#) Web site for its Recycled Material Advisory Notices (RMANs), which recommend recycled-content levels. Or order paper copies of the RMANs or Comprehensive Procurement Guidelines by contacting the National Service Center for Environmental Publications at (800) 490-9198.

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[2] Ibid.

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[14] From California Integrated Waste Management Board staff communication with Office of the Federal Environmental Executive staff on December 12, 2005.

[15] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Vehicular Products Fact Sheet. Available at <http://www.epa.gov/cpg/factshts.htm>.

[16] Ibid.

[17] Solid Waste Management Coordinating Board of Minnesota. Environmentally Preferable Purchasing Guide, Section 7.4. Available at: <http://www.rethinkrecycling.com/government/eppg/-buy-products-services/vehicles-and-related-products>.

[18] California Integrated Waste Management Board. State Agency Buy Recycled Campaign Training Manual for FY 03/04, page 18. Available at: <http://www.calrecycle.ca.gov/BuyRecycled/StateAgency/Manual/>.

[19] Ibid.

[20] Arizona Department of Transportation. Survey of Tire Debris on Metropolitan Phoenix Highways. 1999. Available at <http://www.retread.org/>.

[21] Tire Retread Information Bureau. 2005 Fact Sheet Retreaded Tires. Available at: <http://www.retread.org/>.

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[23] California Integrated Waste Management Board. State Agency Buy Recycled Campaign Training Manual for FY 03/04, page 18. Available at: <http://www.calrecycle.ca.gov/BuyRecycled/StateAgency/Manual/>.

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[25] United States Environmental Protection Agency. 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Vehicular Products Fact Sheet. Available at: <http://www.epa.gov/cpg/factshts.htm>.

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[27] Solid Waste Management Coordinating Board of Minnesota. Environmentally Preferable Purchasing Guide, Section 7.4. Available at: <http://www.rethinkrecycling.com/government/eppg/-buy-products-services/vehicles-and-related-products>.

## Environmentally Favorable Traffic Control Products

### Overview

Today's savvy buyer of traffic control products favors recycled content. From delineators, channelizers, object markers, cones and barricades (traffic control devices), products containing up to 100% recycled content are widely available. These products manufactured from recycled materials feature high quality and durability at a cost that is competitive with products made from non-recycled (virgin) materials.

### Performance

Transportation products containing recovered materials must conform to the [California Manual on Uniform Highway Traffic Control Devices \(CA MUTCD\)](#) and with the approved standard specifications used by the State of California, as well as other applicable requirements and specifications. The traffic control devices listed in **'Table A'** are tested by the Department of Transportation (Caltrans) and they are included in Caltrans' **"Prequalified and Tested Signing and Delineation Materials"** list. When consumers buy products, it is recommended that they consider cross-checking to determine whether the product listed in **'Table A'** is also listed within Caltrans Standard Special Provisions (SSP) **"Prequalified and Tested Signing and Delineation Materials."**

Experience has shown that transportation products made with recycled materials are sturdy and durable. Many of these products have multi-year warranties. Some recycled products are also easier to install than the products they replace.

The recycled products have been found to deliver high performance and often reduce installation and maintenance costs.

### Availability

Recycled-content transportation products can be purchased through supply catalogs, local distributors, or directly from the manufacturer.



## **Cost**

Costs of transportation products made with recycled material are competitive with those made from non-recycled (virgin) materials. For several products, the advantages are three-fold: recycled materials substitutes for a less durable material, requires less maintenance, and provides a longer service life.

## **Traffic Cones**

Traffic cones may be used to channelize road users, divide opposing vehicular traffic lanes, divide lanes when two or more lanes are kept open in the same direction, and delineate short duration maintenance and utility work (for more detail see Section 6F.59 of CA MUTCD).

## **Barricades**

Traffic barricades are used to control road users by closing, restricting, or delineating all or a portion of the right-of-way. Barricades can be made from wood, steel, plastic or a combination of these materials. Many manufacturers have switched to the use of recycled plastic materials. Recycled plastic barricades have worked quite well, they do not rust or corrode. They do not become potential projectile when hit, and they are light in weight and easy to handle.

Barricades are classified as Type I, Type II, or Type III (see Section 6F.63 Type I, II, or III Barricades of CA MUTCD for more detail).

## **Delineator and Channelizer**

The function of channelizing devices is to warn road users of conditions created by work activities in or near the roadway and to guide road users. Channelizing devices include cones, tubular markers, vertical panels, drums, barricades, and temporary raised islands.

Channelizing devices provide for smooth and gradual vehicular traffic flow from one lane to another, onto a bypass or detour, or into a narrower traveled way. They are also used to separate vehicular traffic from the work space, pavement drop-offs, pedestrian or shared-use paths, or opposing directions of vehicular traffic. Delineators may be used in Temporary Traffic Control (TTC) zones to indicate the alignment of the roadway and to outline the required vehicle path through the TTC zone.

Channelizing devices should be constructed and ballasted to perform in a predictable manner when inadvertently struck by a vehicle. Channelizing devices should be crashworthy. Fragments or other debris from the device or the ballast should not pose a significant hazard to road users or workers

# **Vehicles/Transportation - Road Aggregate**

## **Environmental and Health Issues and Recommendations**



### **Recycled Content:**

The use of recycled aggregate, rather than virgin aggregate, will help to conserve finite natural resources and help keep waste asphalt, concrete, and other inerts out of landfills.



### **Air Quality, Energy Conservation, Global Warming:**

If recycled aggregate is produced on-site or obtained from sources that are closer to the project site than virgin aggregate quarries, this can reduce the environmental impacts associated with using fossil fuel in

transport trucks. Reducing the use of fossil fuel reduces air pollution, conserves energy, and reduces greenhouse gas emissions.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
  - [Air Quality, Energy Conservation, Global Warming](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

Aggregate consists of hard, graduated fragments of inert mineral materials, including sand, gravel, crushed stone, slag, rock dust, or powder. Recycled aggregate is produced by crushing concrete, and sometimes asphalt, to reclaim the aggregate according to strict manufacturing standards. In 2004, California imported more than two million tons of virgin construction sand and gravel, [1] and disposed of 977,000 tons of aggregate rich asphalt and concrete. [2] Recycled aggregate can be used for many purposes. The primary markets are for road base and subbase.

The use of recycled aggregate can save money for local governments and other purchasers, create additional business opportunities, save energy when recycling is done on-site, conserve diminishing resources of virgin aggregates, and help local governments meet the diversion goals of the [California Integrated Waste Management Act of 1989](#).

A **roadway** is built in several layers: pavement, base, and sometimes sub-base. The **pavement** is the surface layer, and is made of portland cement concrete (PCC) or asphalt concrete (AC). The **base** layer supports the pavement, and is made of **aggregate base (AB)**. The subbase layer supports the base and is made of **aggregate subbase (ASB)**. The subbase layer allows more sand, silt and clay than the AB layer; the subbase layer has less strength, but is used because it is more economical when bringing the road up to grade (finished height).

Along with AB and ASB, recycled aggregate can also be used for engineered fill, fill for utility trenches, or other construction base material. Always make sure the material used meets the specifications for the project.

## Environmental and Health Issues

### RECYCLED CONTENT

Inert solid waste is concrete, asphalt, dirt, brick, and other rubble.

PCC and AC consist primarily of aggregate and either cement or asphalt as a binder. Some PCC contains steel reinforcement bars, or "rebar," such as a bridge deck or tilt-up slabs. When a road or structure is demolished, the rebar can often be seen protruding from the broken chunks of PCC.

Recycled aggregate comes primarily from PCC and AC from road demolition, rehabilitation, and maintenance; building demolition; and leftover batches of AC and PCC. AC or PCC feedstock waste can either be hauled to a construction and demolition waste processor or can be processed on-site. Strict quality control standards are implemented by processors to ensure that deleterious materials such as wood, plastic, metals and other contaminants are not commingled with the waste AC or PCC. Waste concrete or asphalt is then processed by running the material through a series of crushers and screens to a specified size or gradation. Quality feedstock, material with little deleterious material, will make a higher quality end product. It can either be stockpiled at a facility or processed on-site for use in the project.

## **AIR QUALITY, ENERGY CONSERVATION, GLOBAL WARMING**

Depending on certain factors, air pollution may be reduced with the use of recycled aggregate. Many quarries are located in outlying areas, away from project sites; while recycling facilities are often located in or near many communities where road construction occurs. Trucks transporting aggregate to the job-site are sources of both greenhouse gases and particulate matter. Reducing the number of trip miles by using locally produced recycled aggregate will help reduce those types of pollution, and save energy in the form of fossil fuel used to power transport trucks. On-site processing may eliminate those trip miles completely.

Finally, crushing of concrete creates dust; therefore, [proper controls](#) should be in place.

## **LAWS AND GUIDELINES**

### **California**

#### ***Statute***

#### **California Integrated Waste Management Act (IWMA) of 1989 ([Assembly Bill 939](#), Sher, Chapter 1095, Statutes of 1989)**

Among other things, the IWMA required each city or county to divert 50 percent of solid waste from landfills and transformation facilities by 2000 through source reduction, recycling, and composting activities. The use of recycled aggregate can save money for local governments and other purchasers, create additional business opportunities, save energy when recycling is done on-site, conserve diminishing resources of urban aggregates, and help local governments meet the diversion goals of the IWMA.

#### **[Chapter 392, Statutes of 2006](#) (Simitian, Senate Bill 420)**

This bill amended Section 42701 of the Public Resources Code to read:

42701. (a) In purchasing any materials to be used in paving or paving subbase for use by the Department of Transportation and any other state agencies that provide construction and repair services, the State Procurement Officer shall contract for those items that utilize recycled materials in paving materials and base, subbase, and pervious backfill materials, unless the Director of Transportation determines that the use of the materials is not cost effective. In determining the cost-effectiveness of the materials subject to this section, the factors that the director shall consider include both of the following: (1) The lifespan and durability of the pavement containing the materials. (2) The maintenance cost of the pavement containing the materials. (b) This section also applies to any person who contracts with the Department of General Services or with any other state agency to provide these construction and repair services. (c) The recycled materials shall include, but are not limited to, recycled asphalt, crushed concrete subbase, foundry slag, and paving materials utilizing crumb rubber from automobile tires, ash, and glass and glassy aggregates. The specifications shall be based on the standards of the Department of Transportation for recycled paving materials and for recycled base, subbase, and pervious backfill materials.

### State and Local Permitting Issues

On-site processing may require certain State and local permits, such as air, water, and zoning.

- **Air Permits:** The [local air districts](#) may be concerned about nuisance odors and may require processors to spray materials with water to control dust.
- **Water Permits:** The [Regional Water Quality Control Board](#) may require a permit for the facility depending on feedstock and location.
- **Solid Waste Permits:** Regulations affecting construction and demolition (C&D) and inert debris transfer/processing generally exempt on-site processing from Solid Waste permit requirements. Contact your [Local Enforcement Agency \(LEA\)](#) for more information.

### Federal

The Federal Highway Administration's (FHWA) [Recycled Materials Policy](#) is:

1. Recycling and reuse can offer engineering, economic and environmental benefits.
2. Recycled materials should get first consideration in materials selection.
3. Determination of the use of recycled materials should include an initial review of engineering and environmental suitability.
4. An assessment of economic benefits should follow in the selection process.
5. Restrictions that prohibit the use of recycled materials without technical basis should be removed from specifications.

## PERFORMANCE

As long as the recycled aggregate meets the project specification, it will perform the same as virgin material.

## AVAILABILITY

According to the California Integrated Waste Management Board's (CIWMB) [2004 Statewide Waste Characterization Study](#):

- **Construction and Demolition (C&D):** C&D materials made up about 22 percent of California's disposed waste stream, or approximately 8.7 million tons.
- **Asphalt and Concrete:** Asphalt and concrete represent more than 977,000 tons of disposal or about 2.4 percent.

According to the CIWMB's current information, there are approximately 100 producers of recycled aggregate in California. [3] Some receive PCC and/or AC at the plant; others have mobile equipment for in-place recycling. Aggregate recyclers are included in two databases: [Construction and Demolition Debris Recyclers--Processors & Receivers](#) and [Recycled-Content Construction Products](#).

## COST

Because of the weight of aggregate, transportation plays a large role in its cost. As transportation costs continue to rise, locally produced recycled aggregate will often be considerably less expensive than virgin material that needs to be brought in from an outlying quarry. Depending upon the location of the project and its proximity to a recycler, recycled aggregate can be cost neutral, or cost less per ton than virgin aggregate. The amount of money saved for a project can range from \$3 to \$10 a ton. [4]

### On-site processing

When performing a road rehab or rebuild or a building demolition, processing on site may offer the greatest cost savings. On-site processing of project waste materials should:

- Reduce costs associated with disposal and hauling since the re-used material will not leave the site, and

- Reduce or eliminate the costs to purchase and haul aggregate to the job-site.

## SPECIFICATIONS

### California

#### **California Department of Transportation (Caltrans) Specifications**

Many local jurisdictions use [Caltrans specifications](#). In Southern California, the *Greenbook* is commonly used (see [Greenbook](#) discussion below). Where recycled aggregate is allowed, it must also, of course, meet the same grading and quality specifications as virgin aggregate.

**Caltrans Specifications-Procedures:** Caltrans takes a new specification through three stages:

- **Special Provision (SP).** First it is an SP where it is used initially on a number of projects.
- **Standard Special Provision (SSP).** After the SP has been used successfully for a period of time, it usually becomes an SSP which means that it is a method approved by Caltrans.
- **Standard Specification.** After the SSP has been used successfully for a period of time, then it usually becomes a Standard Specification, and is included in Caltrans Standard Specifications which are published every four years.

**Caltrans Specifications-Existing:** [Caltrans' May 2006 Standard Specifications](#) cover aggregate base and aggregate subbase in Sections 25 and 26. These sections allow up to 50 percent recycled aggregate. [Caltrans' SSPs](#) allow up to 100 percent "reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base," or "glass" in Class 2 and 3 aggregate base, and also in Class 1, 2, and 3 aggregate subbases.

#### **Greenbook Specifications**

The *Greenbook*, or *Standard Specifications for Public Works Construction*, is used by the City and County of Los Angeles and 200 other local governments and agencies in the Los Angeles area. It is updated and published every three years by the Joint Cooperative Committee of the Southern California Chapter of the American Public Works Association, and the Southern California Districts of the Associated General Contractors of California. Supplements are published yearly. The *Greenbook* includes both English and metric units, and is available through [BNi Building News](#).

#### **Aggregate Base Specifications**

In Section 200-2, "Untreated Base Materials," the *Greenbook* includes four categories of aggregate base that are of interest here:

- Crushed Aggregate Base (CAB) does NOT include recycled aggregate. CAB may sometimes be specified where recycled base (crushed miscellaneous base or processed miscellaneous base) would also meet requirements.
- Crushed Miscellaneous Base (CMB) allows recycled aggregate. The *Greenbook* states that CMB "shall consist of broken and crushed AC or PCC and may contain crushed aggregate base or other rock."
- Processed Miscellaneous Base (PMB) also allows recycled aggregate. The *Greenbook* states that PMB "shall consist of broken or crushed AC, PCC, railroad ballast, glass, crushed rock, rock dust, or natural material."
- Select Subbase is the *Greenbook's* only aggregate subbase category. It allows recycled aggregate.

Section 200-2.4 spells out the performance standards for CMB.

#### **American Association of State Highway and Transportation Officials (AASHTO)**

Standard Specification for Reclaimed Concrete Aggregate for Unbound Soil-Aggregate Base Course, AASHTO Designation: M 319-02

## VENDORS

According to the CIWMB's current information, there are approximately 100 producers of recycled aggregate in California. [\[5\]](#) Some receive PCC and/or AC at the plant; others have mobile equipment for in-place recycling. Aggregate recyclers are included in two CIWMB databases: [Construction and Demolition Debris Recyclers--Processors & Receivers](#) and [Recycled-Content Construction Products](#).

## SUCCESS STORIES

### California

#### **California Department of Transportation (Caltrans)**

Recycled aggregate has been successfully used by Caltrans as road base and subbase since the 1970s.

#### **San Mateo County**

"In 2005, San Mateo County adopted a policy specifying that recycled aggregate be the preferred material for all non-structural concrete applications, including but not limited to sidewalks, base material, and sub base material. Suppliers have been able to provide the material needed at the same or lower cost, and results have been favorable. Not only has the county been able to implement this policy without added cost to the taxpayers, it supports the County's long term goal to reduce the amount of material that needs to be landfilled." [\[6\]](#)

### Minnesota

See the [Road Aggregate section](#) of the *Environmentally Preferable Purchasing Guide*, published by the Solid Waste Management Coordinating Board of Minnesota.

## RESOURCES AND WEBSITES

### Alberta, Canada, Government of

#### **Construction, Renovation & Demolition Waste Reduction**

See the following report: *Market Development Study for Recycled Aggregate Products*. Report to Waste Reduction Advisory Committee, Alberta, Canada (PDF, 34 pages, size unknown).

#### **[American Public Works Association](#)**

Kansas City, MO

(816) 472-6100

The American Public Works Association is an international educational and professional association of public agencies, private sector companies, and individuals dedicated to providing high quality public works goods and services.

#### **[California Department of Conservation](#)**

##### **Division of Mines and Geology (aka [California Geological Survey](#))**

Sacramento, CA

(916) 445-5716

Although the official name for the Division remains the "Division of Mines and Geology," in January 2002, the Department of Conservation's Director established its pseudonym as the "California Geological Survey" (CGS). The mission of CGS is to provide scientific products and services about the state's geology, seismology and mineral resources including their related hazards that affect the health, safety, and business interests of the people of California.

#### **California Department of Transportation (Caltrans)**

##### **Office of Rigid Pavement Materials and Structural Concrete (ORPSC)**



Sacramento, CA  
(916) 227-7281

The ORPSC provides technical expertise, recommendations, and quality assurance testing for the cement, aggregate and concrete used in highway projects.

**California Integrated Waste Management Board (CIWMB)**

Sacramento, CA  
(916) 341-6300

The CIWMB's mission is to reduce waste, promote the management of all materials to their highest and best use, and protect public health and safety and the environment, in partnership with all Californians.

See the following on-line resources:

- **Construction/Demolition and Inert Debris Resources Web site**
- **Databases**
  - C&D Debris Recyclers--Processors & Receivers. A searchable database of sites in California that receive construction and/or demolition materials for recycling or reuse, including concrete, asphalt and brick.
  - Recycled-Content Construction Products. A searchable database of manufacturers of recycled construction products sold in California, including aggregate.
- **Publications** (The links provided below are to the HTML versions, if available.)
  - Asphalt Roofing Shingles in Aggregate Base. An overview of recycling ground asphalt roofing shingles into aggregate base. (Pub. #431-97-032)
  - Market Status Report: Recycled Inerts (October 1996). An 11-page report discussing recycled aggregate, asphalt pavement, asphalt roofing shingles, and drywall. (Pub #431-96-063)
  - Resource Guide for Recycling-Based Businesses. A 57-page directory of information from the public and private sectors, including business development, technical, financial, and feedstock assistance. (Pub. #412-97-028)
  - See also the Publications Catalog for a complete list of construction and demolition (C&D) publications, including downloadable Word versions and the option to order hard copies.
- **Recycled-Content Materials Marketing Program Web site.**

**California Mining Association (CMA)**

Sacramento, CA  
(916) 447-1977

The CMA represents mining companies, including some aggregate companies.

**Construction & Demolition Recycling Magazine**

Cleveland, OH  
(216) 961-4130

*Construction & Demolition Recycling* magazine is the official publication of the Construction Materials Recycling Association.

**Construction Materials Association of California (CMAC)**

Sacramento, CA  
916-554-1000

The CMAC is the Northern California trade association for aggregate and ready mixed concrete producers, suppliers, and service providers from the Oregon border to Bakersfield. It is a non-profit member organization.

**Contractors Register, Inc. -- Free Directory of the Construction Industry**

**The Blue Book of Building and Construction**

Jefferson Valley, NY

(800) 431-2584

(916) 485-3832 (Sacramento representative)

Since 1913, *The Blue Book of Building and Construction* has been the construction industry's premier information source.

#### **King County Environmental Purchasing Program**

Seattle, WA

(206) 296-0100

(800) 325-6165

A pioneer and contemporary model in environmental procurement, King County maintains a [Recycled Concrete Aggregate Web page](#).

#### **United States Department of Transportation**

##### **Federal Highway Administration (FHWA)**

Washington, DC

The FHWA is charged with the broad responsibility of ensuring that America's roads and highways continue to be the safest and most technologically up-to-date. See the following online resources:

- [Recycled Concrete Study Identifies Current Uses, Best Practices](#)
- [User Guidelines for Waste and Byproduct Materials in Pavement Construction](#)

#### **United States Environmental Protection Agency (USEPA)**

Washington, DC

(202) 272-0167

The mission of the USEPA is to protect human health and the environment. The following report is accessible from the USEPA's Web site:

- *A Study of the Use of Recycled Paving Material*, Report to Congress as specified in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Report No. FHWA-RD-93-147, EPA/600/R-93/095. To locate this report online, go to the USEPA's National Environmental Publications Information System Publication Title Index Web page, and then choose the 600 Series.

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[1] Kohler, Susan, 2004, California Non-Fuel Minerals-2004: California Geological Survey. Available at [http://www.consrv.ca.gov/CGS/minerals/min\\_prod/non\\_fuel\\_2004.pdf](http://www.consrv.ca.gov/CGS/minerals/min_prod/non_fuel_2004.pdf).

[2] California Integrated Waste Management Board, 2004, Statewide Waste Characterization Study. Available at <http://www.ciwmb.ca.gov/Publications/LocalAsst/34004005.doc>.

[3] California Integrated Waste Management Board. Construction and Demolition Recycling, Recycled Aggregate Web page. Available at <http://www.calrecycle.ca.gov/condemo/aggregate/default.htm>. Accessed on 12-5-06.

[4] California Integrated Waste Management Board. Recycled-Content Materials Marketing Program. *Recycled Aggregate* fact sheet. Accessed on 12-1-06.

[5] California Integrated Waste Management Board. Construction and Demolition Recycling, Recycled Aggregate Web page. Available at <http://www.calrecycle.ca.gov/condemo/aggregate/default.htm>. Accessed on 12-5-06

[6] California Integrated Waste Management Board. Recycled-Content Materials Marketing Program. *Recycled Aggregate* fact sheet. Available Accessed on 12-1-06.

## **Vehicles/Transportation - Rubberized Asphalt Concrete**

### **Environmental and Health Issues and Recommendations**



#### **Recycled Content:**

California is faced with the significant challenge of diverting or safely managing more than 40.2 million reusable and waste tires generated each year. California has an estimated 1.5 million waste tires that have been illegally dumped or stockpiled. These stockpiles pose a potential threat to public health, safety, and the environment.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Recycled Content](#)
- [Laws and Guidelines](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

California has more registered vehicles than any other state. As a result, approximately 40 million reusable and waste tires are generated each year. An additional 1.5 million waste tires remain in unpermitted stockpiles throughout the state, posing a health and safety risk for the public.

California is faced with the challenge of diverting or safely managing these waste tires. The California Integrated Waste Management Board (CIWMB) is dedicated to finding new uses for this valuable resource, and to working in cooperation with local governments, industries, and the public towards reaching this goal. CIWMB staff estimates that of the approximately 40 million reusable and waste tires generated in 2004, approximately 30 million of the tires (75 percent) were diverted through various alternatives, including reuse, retreading, and combustion.

Currently, the recycling markets in California do not consume all of the waste tires generated. Waste tires need to be stored safely until sufficient markets are in place to increase the consumption of waste tires. The CIWMB provides a waste tire management framework by enforcing waste tire facility and waste tire hauler regulations. As the use of tires as feedstock material in commercial applications increases, illegal stockpiling and the need for permitted storage will decrease or cease to exist.

The California Department of Transportation (Caltrans) is committed to helping reduce the number of waste tires entering California's landfills. Since 2002, Caltrans has utilized more than 9 million waste tires in highway construction projects, averaging nearly 2 million waste tires per year. Of this amount, approximately 8 million waste tires were used in rubberized asphalt concrete (RAC) projects.

### Environmental and Health Issues

## RECYCLED CONTENT

Caltrans has established a variety of uses for waste tire products. They include RAC as a pavement alternative and tire-derived aggregate (TDA), which consists of shredding waste tires and using them as lightweight fill material for embankments. In addition, Caltrans uses recycled offset blocks in metal beam guardrail installations and recycled rubber mats for weed control underneath guardrails. When appropriate and cost-effective, RAC and TDA are the department's first choice.

Caltrans has been using rubber (called crumb rubber modifier (CRM)) in asphalt pavements since the 1970s, in chip seals, and the 1980s, in rubberized asphalt concrete. Early trials included the use of both the wet and dry processes of incorporating CRM; however, most of the work completed in the 1990s and in this decade has employed the wet process. The performance of the projects has varied from poor to excellent, but in recent years improved specifications and practices have provided more consistent performance. Other agencies, primarily the Arizona, Florida and Texas Departments of Transportation, have also used scrap tire rubber in asphalt pavements over this same period, generally with good success.

In 2003, Caltrans established a goal of using at least 15 percent RAC compared to all flexible pavement by weight. The department has exceeded this goal each year. Currently, RAC usage is at an all-time high in Caltrans.

Beyond the obvious environmental benefit of reducing landfill waste by recycling scrap tires for use in pavements, there could also be pavement performance enhancements such as improved durability and reduced noise. In January 2004, Caltrans and the CIWMB entered into an interagency agreement to supplement Caltrans effort in arriving at technically sound, cost effective, and environmentally friendly solutions to scrap tire management through the increased use of scrap tire rubber in roadway projects.

While Caltrans has met its goal in the amount of RAC tonnage, local governments are using the product more and more. In addition to two CIWMB RAC grant programs that may total \$4 million or more, the California Legislature added an additional \$5 million to the Board's budget this year (and, it is expected, next year) for RAC and tire-derived aggregate grant programs.

Detailed information on RAC emissions, environmental and health issues are available at the following sites:

[SAC County Emission Cover Letter:](#)  
[Air Quality Issues and Best Management Practices With the Production of Asphalt-Rubber Asphaltic Concrete](#)  
[NIOSH Health Hazard Evaluation Report:](#)  
[Hot Mix Asphalt Plants Emission Assessment Report](#)  
[Stack Emissions with Asphalt-Rubber](#)

## **LAWS AND GUIDELINES**

### **California**

#### ***Statute***

In 2005, Assembly Bill (AB) 338 was passed. AB 338 requires Caltrans, to the extent feasible, to phase-in the use of crumb rubber asphalt (CRA) on its highway construction and repair projects at the following levels:

- a. By January 1, 2007, a minimum 6.62 lbs CRM/tonne total AC pavement to be used.
- b. By January 1, 2010, a minimum 8.27 lbs CRM/tonne total AC pavement to be used.
- c. By January 1, 2013, a minimum 11.58 lbs CRM/tonne total AC pavement to be used.

#### **AB939**

#### **AB 338 Assembly Bill**

AB 338 requires Caltrans to gradually phase in the use of crumb rubber, which is used to make rubberized-asphalt concrete, on state highway construction and repair projects, to the extent feasible. The crumb rubber used is required to be manufactured in the United States, and derived from waste tires taken from U.S. owned and operated vehicles.

Division of Design - Resource Conservation - **SB 1346**  
Summary of **SB 876**: Five-Year Tire Management Plan

For more information and extensive guidelines visit the following site:

**ASPHALT RUBBER USAGE GUIDE**

January 2003

**Federal**

To be determined.

**PERFORMANCE**

In 2002, Caltrans embarked on a study to evaluate the overall effectiveness of using RAC overlays under a warranty specification in which the contractor would repair (at his own expense) any significant distress that occurs in the first three or five years after construction, depending on the type of the project. The overall purpose of the study was to help provide a "level playing field" for all rubber-modified mixtures that contain a minimum of 15 percent scrap tire rubber. These sections could be constructed using the "wet process" (RAC-G), "terminal blend" (MB), or the "dry process".

Data gathered and analyzed as part of a well-coordinated plan were to be used to evaluate the overall performance and cost effectiveness of the use of RAC.

The performance data collected for the five RAC projects are presented within five separate sections of this report. The report concludes with a summary of the findings thus far and recommendations for continued testing within each of the RAC projects. Overall, the results to date indicate that the RAC projects should generally perform well over the five-year warranty period and the intended 10-year design lives. It is likely that some projects may deteriorate sooner and require more maintenance than others. However, the expectation is that the overall performance should be satisfactory and that RAC overlays are a good candidate for use under a warranty-type specification.

For detailed information on RAC performance refer to the reports available on the Office of Flexible Pavement Materials home page (RAC publications).

<http://www.dot.ca.gov/hq/esc/Translab/fpm/fpmRAC.htm.htm>  
Caltrans RAC specifications (39-400 series)

Many local jurisdictions use Caltrans specifications. In southern California, the Greenbook is also commonly used. The Greenbook is available at: [BNI Building News](#)

**AVAILABILITY**

Asphalt Rubber Binder used in RAC is readily available throughout the State. For more information refer to the following sites:

<http://rubberpavements.org/>  
<http://www.calrecycle.ca.gov/Tires/>  
<http://ladpw.org/epd/tirerecycling/RAC-REAS.cfm>

**COST**

According to the Rubber Pavements Association (RPA), the cost of RAC has decreased substantially since the patents have expired. The cost is nearly half of what it was in 1985. Currently, crumb rubber costs about \$.12 - \$.15 a pound. RAC costs roughly \$2.50 per square yard (one inch thickness)

compared to \$1.35/sqyd for conventional Asphalt Concrete (AC). Used in a Friction Course, RAC costs about \$2.15/sqyd compared to \$1.55/sqyd for conventional mixes.

For detailed cost of the Caltrans RAC projects visit the following site. Click on a year and scroll through to Section 39. There are different costs associated given according to type of RAC.

<http://www.dot.ca.gov/hq/esc/oe/awards/>

Year	Conventional AC tonnes	RAC tonnes	RAC Percentage
1999	7,030,000	420,210	5.6%
2000	7,913,000	1,458,800	15.6%
2001	5,215,000	637,272	10.9%
2002	4,142,000	258,805	5.9%
2003	2,218,000	414,160	15.7%
2004	3,038,238	657,700	17.8%
2005	1,647,984	877,704	34.8%

#### Assumptions:

Passenger Tire Equivalent (PTE) = 20 lbs. per tire

Crumb Rubber Modifier (CRM) = 12 lbs CRM is produced per PTE

2.72 PTE per metric ton of RAC

## SPECIFICATIONS

Caltrans specifications for RAC (39-400 and 39-480)

**Caltrans Specifications-Procedures:** Caltrans takes a new specification through three stages:

**Special Provision (SP).** First it is an SP where it is used initially on a number of projects.

**Standard Special Provision (SSP).** After the SP has been used successfully for a period of time, it usually becomes an SSP which means that it is a method approved by Caltrans.

**Standard Specification.** After the SSP has been used successfully for a period of time, then it usually becomes a Standard Specification, and is included in Caltrans Standard Specifications which is published every four years.

Many local jurisdictions use Caltrans specifications. In Southern California, the *Greenbook* is commonly used.

**What is the *Greenbook*?** The *Greenbook*, or Standard Specifications for Public Works Construction, is used by the city and county of Los Angeles and 200 other local governments and agencies in the Los Angeles area.

**Who Publishes It?** It is published by the Joint Cooperative Committee of the Southern California Chapter of the American Public Works Association, and the Southern California Districts of the Associated General Contractors of California.

**How Often?** It is updated and republished every three years. Supplements are published yearly.

**Where Can I Get It?** The *Greenbook* includes both English and metric units, and is available through:

[BNI Building News](#)

1612 S. Clementine St.



Anaheim, CA 92802  
(714) 517-0970

## **VENDORS**

The (RPA) home page is linked to the following sites:

[Advanced Recycling Sciences, Inc.](#)  
[All States Asphalt](#)  
[American Recycler](#)  
[Arizona Department of Transportation](#)  
[Asfaltomeros, S.A.](#)  
[Asphalt Rubber Technology Service](#)  
[California Tire Report](#)  
[CEI Enterprises](#)  
[Columbus McKinnon](#)  
[CONSULPAV - Consultores e Projectistas de Pavimentos, Lda](#)  
[Cox Paving Company](#)  
[Crumb Rubber Manufacturers](#)  
[D & H Equipment](#)  
[EAPDD](#)  
[Granite Construction Company](#)  
[International Surfacing Systems](#)  
[Law Engineering LAWGIBB Group](#)  
[L.A. Country Rubberized Asphalt Technology Transfer Center](#)  
[PaveTex Engineering and Testing](#)  
[Puritan Magnetics](#)  
[Recycled Materials Resource Center\](#)  
[Rubber Division, American Chemical Society](#)  
[Scrap Tire Management Council](#)  
[Scrap Tire News](#)  
[Speedie and Associates](#)  
[Unix Rubber](#)  
[USEPA - Greenscapes](#)  
[USEPA - Resource Conservation Challenge](#)  
[Valley Slurry Seal](#)  
[Western States Surfacing](#)

## **SUCCESS STORIES**

### **California**

**RAC is cost-effective for appropriate applications.** A two-inch thick rubberized asphalt concrete overlay can potentially save as much as \$50,000 per lane mile when compared to a four-inch thick conventional asphalt overlay.

**RAC is durable, safe, and quiet.** RAC provides better traction and visibility in wet weather, which may reduce highway accidents. Additionally, many argue that using RAC potentially provides for quieter roadways. Research has shown that noise can be reduced as much as 85 percent using an open graded rubberized friction course. It is unknown at this point if the noise reduction is attributed to the addition of rubber or if it is due to the surface pores associated with open graded pavements.

**RAC is environmentally friendly.** A two-inch thick resurfacing project uses over 2,000 scrap tires per lane mile. This means that for a one-mile section of a four-lane highway, over 8,000 scrap tires can be used.

### **What can be done to reduce environmental hazards of our remaining scrap tires?**

The good news is that due to the passage of State Assembly Bill 1843 in 2000 and the establishment of the Tire Recycling Management Act, the California Integrated Waste Management Board (CIWMB) is leading a revitalized effort to recycle tire material. CIWMB provides assistance by promoting the use of rubberized asphalt concrete, commonly known as RAC and affectionately referred to as "rubber roads." Rubberized asphalt concrete, a paving product made from aggregates, asphalt cement and reclaimed tire rubber.

The city of Thousand Oaks knows firsthand the benefits of using RAC. The city has been using the product since 1992. To date, Thousand Oaks has used rubber from 1.3 million discarded tires to resurface hundreds of miles of surface streets. The city found that the improvements-increased skid resistance, reduced road noise, improved riding qualities and imperviousness to water-have made the use of RAC cost effective and more desirable than traditional asphalt concrete.

Thousand Oaks is not the only city that has used RAC. The CIWMB awarded more than 60 grants totaling \$4.2 million between January and April of this year alone. Many of these grants help first-time or limited-RAC users, including San Clemente, Fremont, Rancho Cordova, Brea, San Fernando, Galt, Ripon and Nevada City, to name just a few. Individuals, businesses, local governments, universities, school districts, park districts, and qualified California Indian tribes are also eligible to apply for the grants.

### **RESOURCES AND WEBSITES**

The CIWMB is mandated to regulate and manage waste tires within the state. The Legislature recognized the need for waste tire management and passed the California Tire Recycling Act in 1989. To further strengthen waste tire management, the Legislature passed Senate Bill (SB) 876 in 2000 to augment the California Tire Recycling Act. For more information, read the [Overview of Tire Management in California](#).

#### **Rubberized Asphalt Concrete Grants (SB 1346)**

This grant program provides funding to local governments for rubberized asphalt concrete (RAC) projects. The application period for the [fiscal year 2005-06](#) is now closed. The Board awarded funding to the recommended applicants at its [April 2006 Board meeting](#). The application period for the fiscal year 2006-07 cycle is anticipated to occur in September 2006.

#### **Targeted Rubberized Asphalt Concrete Incentive Grants**

This grant program also provides funding to local governments for rubberized asphalt concrete (RAC) projects. The [fiscal years 2005-06 and 2006-07](#) application is now available. **Applications are being accepted on a monthly basis.**

Setting up a new concrete and asphalt recycling plant requires certain State and local permits, such as air and water, and zoning.

**Where Can I Get Help?** Businesses starting or expanding into recycling activities may get financial, technical, marketing, business and permitting assistance from the "[R-Team](#)" at CIWMB, at (916)341-6526.

**Air Permits:** The local air districts may be concerned about nuisance odors and various emissions, and may require processors to spray materials with water to control dust. [Locate your local air district](#) by calling the Air Resources Board at (916) 322-2990 or by checking their Web site at

**Water Permits:** The Regional Water Quality Control Board may require a permit for the facility depending on feedstock and location. Look up your regional board in a local phone book under State Government, Water Quality Control Board.

## Vehicles/Transportation - Light-Duty Vehicles

### Environmental and Health Issues and Recommendations



#### [Air Quality:](#)

Motor vehicles are California's leading source of air pollution. More than 95 percent of Californians live in areas that fail to meet federal or state air quality standards. [\[1\]](#)

- Drive less or use cleaner vehicles to achieve our health-based air quality goals.



#### [Global Warming / Climate Change:](#)

In California, transportation is the source of more than half of the carbon dioxide (a greenhouse gas) emissions from fossil fuels. [\[2\]](#)

- Drive less and use fuel-efficient vehicles that emit lower levels of greenhouse gases.



#### [Conserves Energy:](#)

"Roughly half of all the energy used in California is used by the transportation sector. We use more than 16.5 billion gallons of gasoline a year. That's enough to drive a car, getting 30 mpg, three round trips to the sun." [\[3\]](#)

- Drive less and use fuel-efficient vehicles to save energy.



#### [Prevents Waste:](#)

Using rebuilt parts can reduce financial costs and conserve resources. [\[4\]](#)

- Purchase rebuilt parts that meet [Federal Trade Commission guidelines](#).



#### [Less Hazardous:](#)

Less toxic materials can be used to produce and maintain vehicles.

- During vehicle maintenance, request less hazardous replacement components, such as [lead](#)-free wheel weights.



#### [End-of-Life Management:](#)

Vehicular components and maintenance products should be managed in accordance with state laws and regulations.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
  - [Air Quality and Climate Change](#)
  - [Energy Conservation](#)
  - [Waste Prevention](#)
  - [Cleaner Production, Maintenance, and End-of-Life Management](#)
- [Laws, Regulations, and Policies](#)
- [Types of Vehicles, Fuels, and Availability](#)
- [Performance](#)
- [Cost Benefits](#)
- [Specifications](#)
- [Vendors](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

See also [Antifreeze](#), [Batteries](#), [Heavy-Duty Vehicles](#), [Motor Oil](#), [Parts Washing](#), and [Retreaded Tires](#).

**NOTE:** *Most of this section focuses on smart transportation choices that can reduce air pollution and combat climate change. It is important to note that there are smart transportation and vehicle maintenance decisions that can also save energy and natural resources, prevent waste, and keep hazardous waste out of the environment.*

## BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES

### AIR QUALITY AND CLIMATE CHANGE

More than 95 percent of Californians live in areas that fail to meet federal or state air quality standards [5] - a rapidly increasing health hazard. And, motor vehicles alone contribute more than half of the air pollution problem in California. [6] Besides the immediate air quality impact of urban smog from motor vehicles, long-term carbon dioxide emissions contribute to [climate change](#). While today's vehicles are cleaner than they used to be, most new vehicles are not clean enough to counteract the amount of driving Californians do. Simply put, we have to drive less or we have to drive cleaner vehicles, if we want to achieve our health-based air quality goals. (For information on how air pollution affects health, see the California Air Resources Board fact sheet titled "[Air Pollution Sources, Effects and Control](#).")

Motor vehicles are California's leading source of air pollution. California's 34 million residents collectively own more than 25 million vehicles and drive more on average than most other Americans. [7] Controlling pollution from cars and trucks is essential to reducing smog. Through California Air Resources Board (ARB) regulations on vehicles and fuel, today's new cars pollute about 95 percent less than the cars of thirty years ago. [8] Still, more than 50 percent of the state's smog-forming emissions come from motor vehicles.

### ENERGY CONSERVATION

"Roughly half of all the energy used in California is used by the transportation sector. We use more than 16.5 billion gallons of gasoline a year. That's enough to drive a car, getting 30 mpg, three round trips to the sun." [9]

"The demand for transportation fuels in California is increasing. The number of light-duty vehicles is projected to grow from 25.6 million on-road vehicles in 2003 to 35.6 million by 2025.

"Unless we change our habits, petroleum will be the primary source of California's transportation fuels for the foreseeable future, and as demand continues to rise and in-state and Alaskan petroleum supplies diminish, California will rely more and more on foreign imports of crude oil.

"Nearly 100 percent of the state's transportation system is currently fueled by fossil fuels. Moving toward a more diversified range of fuels and supporting the advancement of higher efficiency vehicles are two of the goals of the state's programs." [\[10\]](#)

## **WASTE PREVENTION**

Using rebuilt parts can reduce financial costs and conserve resources. [\[11\]](#) "Rebuilt vehicular parts are vehicle parts that have been re-manufactured, reusing parts in their original form. Rebuilt parts undergo an extensive re-manufacturing and testing process and must meet the same industry specifications for performance as new parts ... To be labeled "rebuilt" or "remanufactured," a part must be processed in accordance with the FTC's [Federal Trade Commission] "Guides for the Rebuilt, Reconditioned and Other Used Automotive Parts Industry," 16 CFR Part 20. Rebuilders must test each part for compliance with FTC specifications and correct defects as necessary." [\[12\]](#) The FTC Guides are available [online](#).

## **CLEANER PRODUCTION, MAINTENANCE, AND END-OF-LIFE MANAGEMENT**

### ***Clean Car Campaign***

The [Clean Car Campaign](#) is a national campaign coordinated by state, regional and national environmental organizations promoting a clean revolution in the motor vehicle industry. According to the Clean Car Campaign:

"The production of vehicles, from the extraction of raw materials to the manufacture and assembly of a finished car or truck, consumes a tremendous amount of resources and results in significant releases of pollutants that impact our environment. According to one estimate, as much as 30,000 pounds of waste is created from the production of a single vehicle. Obviously, creating a "cleaner car" involves reducing these important impacts from vehicle production.

"The [Clean Car Standard](#) encourages changes in vehicle design that focus on the use of nontoxic recyclable materials, and best-in-class manufacturing techniques that reduce the use and release of polluting substances. In particular, the standard calls for 1) best-in-class painting/coating practices, 2) the elimination of heavy metals and other substances of concern, and 3) design for recyclability and maximum use of recycled materials. The standard also supports producer responsibility policies for end-of-life vehicles as a means to increase the use of nontoxic recyclable materials and improve the environmental performance of dismantlers and shredders." [\[13\]](#)

### ***Automotive-Related Materials, Substances, and Practices of Concern***

- [Antifreeze](#) - Purchase recycled antifreeze; recycle used antifreeze; and manage used antifreeze in accordance with applicable hazardous waste laws.
- [Batteries](#) - Manage automotive-type lead-acid storage batteries in accordance with applicable [hazardous waste regulations](#).
- **Lead** - Avoid lead and manage it in accordance with applicable hazardous substance management rules. Lead is found in lead wheel weights, solder in electronics, and lead car batteries. "Lead is a highly toxic metal" that "may cause a range of health effects, from behavioral problems and learning disabilities, to seizures and death. Children 6 years old and under are most at risk, because their bodies are growing quickly." [\[14\]](#)

According to the Clean Car Campaign, "Lead wheel weights are used worldwide to balance vehicle tires. In the U.S., there is nearly 25,000 metric tons of lead in wheel weights of registered

vehicles. These weights are clipped onto the edge of wheels during tire installation and frequently fall off during vehicle use. Approximately 50 percent of vehicles on the road may be missing one or more wheel weight. This accounts for over 5,000 tons of lead wheel weights deposited yearly on U.S. roadways. Once these weights are deposited onto roadways they are rapidly abraded by road traffic and turned into fine lead dust particles that contaminate ground surfaces, storm water and groundwater, and pose a health risk to humans and fish ... Alternative wheel weights are commercially available and used commonly in European auto manufacturing. They include weights made from steel, tin, tungsten, and plastic, all of which are ... more environmentally preferable than lead." [\[15\]](#)

During vehicle maintenance, request lead-free wheel weights. Contact the [California Department of Toxic Substances Control](#) (DTSC) for information on handling waste that contains lead.

For more information, visit the following Web sites:

- Clean Car Campaign. [Lead in Vehicles](#) and [Safer Substitutes for Lead Wheel Weights](#) Web pages.
- Environmental Defense. "[Alternatives to Lead-Acid Starter Batteries](#)." (PDF 78 KB)
- "[Getting the Lead Out: Impacts of and Alternatives for Automotive Lead Uses](#)," a report by Environmental Defense, Ecology Center, and Clean Car Campaign 2003. (PDF, 487 KB)
- [Lead-Free Wheels](#)
- [Minnesota's phase-out of lead wheel weights](#)
- **Mercury** - Avoid components with mercury and manage mercury where it does occur in accordance with applicable [hazardous waste regulations](#). Mercury is found in switches, high-intensity discharge (HID) headlamps, and other devices. "Mercury is a naturally occurring element that is poisonous and can accumulate in the tissues of animals and humans, causing birth defects, nervous disorders, permanent brain damage, and even death through prolonged exposure. It is a highly toxic and persistent metal." [\[16\]](#)

Additional information is available on the following Web sites:

- Clean Air Foundation. [Switch Out](#) is a voluntary program running across Canada, collecting mercury-containing automotive switches from vehicles before they enter the waste stream.
- Clean Car Campaign. [Mercury in Vehicles Web page](#).
- "Detailed Study of Non-Mercury Alternatives as an Environmental Attribute." Prepared for the HQ Defense Logistics Agency. Available on the [Mercury Policy Project's Web site](#) (PDF, 625 KB).
- DTSC's [Mercury Waste Web page](#) provides several publications that address mercury switches and other products that contain mercury.
- King County, Washington. "[Final Report: Automotive Mercury Switch Removal Programs](#)." (PDF, 388 KB)
- Northeast Waste Management Officials' Association. Mercury in Products Database. [Automobile product category](#).
- United States Environmental Protection Agency. [Safe Mercury Management Web page](#).
- See also [Laws and Guidelines](#).
- **Oil** - Purchase [re-refined oil](#); [recycle](#) used oil; and [manage used oil](#) in accordance with applicable laws.
- **Plastics** - Consider if the types of plastics used in vehicles can be recycled or reused. Plastics are found in numerous automotive applications. According to the Clean Car Campaign, "With the use of plastics in automobiles and auto production on the rise globally, plastic waste from discarded autos will continue to flood into landfills and incinerators across the earth."



"The manufacture of plastics poses another set of environmental challenges. Made from non-renewable fossil fuels and toxic chemicals, the plastic products of today are both unsustainable and the source of toxic pollutants." [17]

For more information, visit the following Web site:

- Clean Car Campaign. [Plastics in Vehicles Web page](#).
- **Polyvinyl chloride (PVC)** - Seek vehicles with less PVC, which is found in several automotive applications. According to the Clean Car Campaign, PVC "is a commonly used plastic that has a number of negative environmental characteristics. As a chlorinated plastic, production and waste processes can lead to the formation of deadly toxic emissions. PVC also contains a range of toxic additives, including metals, plasticizers, and hazardous oils that can further lead to contamination and health impacts." [18] In the future, some manufacturers may use [sustainable plastics](#) in vehicles.

For more information, visit the following Web sites:

- Clean Car Campaign. [PVC in Vehicles Web page](#).
- United States Environmental Protection Agency. [Technology Transfer Network Air Toxics Web site -- Vinyl Chloride](#).
- **Tires** - Purchase [retreaded tires](#) and [manage tires](#) in accordance with applicable laws. Retreaded tires are safe, dependable, cost less than comparable new tires, and save a valuable natural resource -- oil.

#### ***Production, Maintenance, and End-of-Life Management***

Important considerations include reduced toxicity, recycled content, and recyclability of components and maintenance products; ease of dismantling for the purposes of recycling or disposal, and take-back services to facilitate recycling.

For more information, visit the following Web sites:

- Clean Car Campaign. [Clean Car Standard Web page](#) (scroll down to "Clean Manufacturing Processes").
- "[Designing for Material Separation: Lessons from Automotive Recycling](#)" by Stewart Coulter, Bert Bras, Gerald Winslow, and Susan Yester. (PDF, 78 KB)
- [European Commission Directive](#). "In 1997, the European Commission adopted a Proposal for a Directive which aims at making vehicle dismantling and recycling more environmentally friendly, sets clear quantified targets for reuse, recycling and recovery of vehicles and their components and pushes producers to manufacture new vehicles also with a view to their recyclability. This legislation was officially adopted ... in September 2000." [19]

#### **Identifying Cars for Cleaner Air**

Vehicle emissions are the result of the combined attributes of fuel type, controls on the engine's operations and maintenance throughout the life of the vehicle. All new vehicles sold in California must be certified to ARB emissions ratings. Vehicle emissions ratings are posted on the Vehicle Emissions Control Information Label found under the hood. California has the unique ability to set emissions standards and has created the most stringent requirements in the world. The certification standards decrease in polluting order:

- LEV (Low Emission Vehicle): The least stringent emission standard for all new cars sold in California.
- ULEV (Ultra Low Emission Vehicle): 50 percent cleaner than the average new 2003 model year vehicle.
- SULEV (Super Ultra Low Emission Vehicle): 90 percent cleaner than the average new 2003 model year vehicle.
- PZEV (Partial Zero Emission Vehicle): Meets SULEV tailpipe standards, has a 15-year/150,000 mile emissions related warranty and enhanced evaporative requirements.

- AT PZEV (Advanced Technology PZEV): Meets the PZEV standards and includes ZEV enabling technology.
- ZEV (Zero Emission Vehicle): Zero tailpipe emissions and 98 percent cleaner than the average new 2003 model year vehicle.

There are several lists showing the [availability](#) of these vehicles.

## LAWS, REGULATIONS, AND POLICIES

### California

**Department of General Services (DGS) Vehicle Purchase and Lease Policy Management Memo (MM) 06-03 (PDF, 110 KB).** References: [Federal Energy Policy Act of 1992](#); [California Vehicle Code section 25252](#); [California Public Resources Code section 25722.5](#); [MM 03-18](#) (PDF, 324 KB); supersedes [MM 04-20](#) (PDF, 31 KB).

- **Alternative Fuel Vehicles**  
As required by the federal Energy Policy Act (EPA) of 1992, 75 percent of the state's light-duty vehicle purchases must be Alternative Fuel Vehicles (AFV). To the maximum extent practicable, the respective alternative fuel shall be used in those vehicles.
- **Gasoline and Hybrid-Electric Powered Vehicles**  
After having met the federal EPA, all vehicles purchased or leased by the state must meet the following minimum requirements:
  - Gasoline-powered light-duty sedans: At a minimum must be certified to the California Air Resources Board's (ARB) LEV II Ultra Low Emission Vehicle (ULEV) standard.
  - Gasoline light-duty pickups, vans and sport utility vehicles: At a minimum be certified to the ARB's LEV I ULEV standard.
- All State offices, agencies and departments shall, when available, maximize the purchase or lease of available light duty vehicles that meet or exceed the ARB's LEV II Super Ultra Low Emission Vehicle (SULEV) standard and are hybrid-electric vehicles or "Best in Class" vehicles that are substantially more fuel efficient.
- **Sport Utility and Four-Wheel Drive Vehicles**  
In order to discourage the purchase or lease of SUVs and four-wheel drive trucks, it must be demonstrated to the Director of the DGS that the vehicle is required to perform an essential function. If approval is granted, an alternative fuel or hybrid version shall be given priority consideration.

**Department of General Services State-Owned or Leased Motor Vehicles [Management Memo \(MM\) 04-22 \(PDF, 206 KB\)](#)**

A state law was established in 2003 to ensure that the state fleet meets new standards to minimize the economic and environmental costs linked with the use of petroleum-based fuels. This DGS Management Memo is the basis of the Vehicle Purchase and Lease Policy discussed above, and describes the requirements of the state law set forth in [Public Resources Code section 25722](#).

**Department of General Services, California Energy-Efficient Vehicle Group Purchase Program**  
Chapter 580, Statutes of 2005 (Pavley, [AB 1660](#)) created "the California Energy-Efficient Vehicle Group Purchase Program in the Department of General Services to encourage the purchase of energy-efficient vehicles, as defined, by local and state agencies through a group-purchasing program."

**[Governor's Executive Order W-100-94 \(PDF, 178 KB\)](#)**

This Executive Order sets forth the order that the DGS Office of Fleet Administration, in consultation with the California Energy Commission, must implement a vehicle purchase plan that is consistent with the federal EPA and ARB's low emission standards.

**State Agency Buy Recycled Campaign**

California law requires state agencies to purchase [recycled antifreeze](#), [re-refined oil](#), and [retreaded tires](#).

**California Mercury Reduction Act of 2001**

The [California Mercury Reduction Act of 2001](#) states that "No person may sell or offer for sale in this state a vehicle manufactured on or after January 1, 2005, that contains a mercury-containing motor vehicle light switch, as defined in Section 25214.5 of the Health and Safety Code, mounted on the hood or trunk."

**Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products**

This regulation mentions a number of vehicle maintenance and undercoating products.

**Chlorofluorocarbons (CFC) in Vehicle Air Conditioners**

[Health and Safety Code section 44472\(d\)](#) states that "On and after January 1, 1995, no person or business shall certify for sale, sell, or offer to sell a new 1995 or later model year motor vehicle equipped with a vehicle air conditioner utilizing" certain CFC-based products.

**Limits on Some Polybrominated Diphenyl Ethers (PBDE)**

[Health and Safety Code section 108922](#) states that "On and after June 1, 2006, a person may not manufacture, process, or distribute in commerce a product, or a flame-retarded part of a product, containing more than one-tenth of 1 percent of pentaBDE or octaBDE, except for products containing small quantities of PBDEs that are produced or used for scientific research on the health or environmental effects of PBDEs."

**Federal****Energy Policy Act of 1992 (EPAAct)**

"The Energy Policy Act of 1992 (EPAAct) was passed by Congress to reduce our nation's dependence on imported petroleum by requiring certain fleets to acquire alternative fuel vehicles, which are capable of operating on nonpetroleum fuels." [\[20\]](#) For more information, visit the United States Department of Energy's [Web site](#).

**Resource Conservation and Recovery Act**

The Resource Conservation and Recovery Act requires procuring agencies to buy recycled-content products designated by the United States Environmental Protection Agency (USEPA) in the [Comprehensive Procurement Guidelines](#) (CPG). Engine coolants, rebuilt vehicular parts, re-refined oil, and retreaded tires are USEPA-designated items. "Procuring agencies include all federal agencies, and any state or local government agencies or government contractors that use appropriated federal funds to purchase the designated items. If your agency spends more than \$10,000 per year on a product designated in the CPG, you are required to purchase it with the highest recycled-content level practicable." [\[21\]](#) This means that the recycled-content ranges recommended in the USEPA's Recovered Materials Advisory Notice (RMAN) for the item in question are met. [\[22\]](#) The [USEPA's recommendations for purchasing vehicular products](#) are available on-line.

**Executive Order 13101 and Federal Acquisition Regulation**

"Executive Order 13101 and the [Federal Acquisition Regulation](#) also call for an increase in the federal government's use of recycled-content and environmentally preferable products." [\[23\]](#)

**Executive Order 13148**

Executive Order 13148 - "Greening the Government Through Leadership in Environmental Management" - directs the USEPA to "convene and chair an Interagency Environmental Leadership Workgroup to develop a list of fifteen priority chemicals. Federal facilities are to reduce the use of these chemicals by at least 50 percent by December 31, 2006. To date, the workgroup has identified five of the fifteen priority chemicals: cadmium, lead, mercury, naphthalene, and polychlorinated biphenyls (PCBs)." [\[24\]](#)

### ***Executive Order 13149***

Executive Order 13149 - "Greening the Government Through Federal Fleet and Transportation Efficiency" - "aims to ensure that the Federal government demonstrates leadership in reducing petroleum consumption through improvements in fleet fuel efficiency and the use of AFVs and alternative fuels. Under E.O. 13149, any Federal agency with a fleet of 20 or more vehicles developed a compliance strategy for reducing its annual petroleum consumption by 20% by the end of FY 2005. Fuel consumption from light-, medium-, and heavy-duty vehicles was included ... To encourage the use of alternative fuels, E.O. 13149 awards additional credits to fleets that fulfill their EPA requirements by purchasing dedicated AFVs and using biodiesel fuel." [\[25\]](#)

## **TYPES OF VEHICLES, FUELS, AND AVAILABILITY**

### **Alternative Fuel Vehicles**

Alternative Fuel Vehicles (AFV) can operate on fuel other than gasoline or petroleum based diesel, such as electricity, ethanol, hydrogen, methanol, natural gas, biologically produced diesel (biodiesel), or propane. Alternative fuels are generally cleaner than gasoline, but adequate controls on the engine are necessary to ensure fewer overall emissions.

- **Flex-fuel:** A flexible fueled vehicle has a single fuel tank, fuel system, and engine. The vehicle is designed to run on unleaded gasoline and an alcohol fuel (usually ethanol) in any mixture. These engines have sensors to analyze the fuel mixture, and adjust the fuel injection and timing. Since fuel composition and engine controls vary widely from one car to the next, flex-fuel vehicles do not ensure fewer emissions than dedicated gas-powered vehicles.
- **Bi-fuel:** A bi-fuel vehicle has two separate fuel systems, one for gasoline or diesel and another for propane, natural gas, or hydrogen. Because these fuels are stored in pressurized tanks, they cannot be simply pumped into the gasoline tank. Like flex-fuel vehicles, bi-fuel vehicle emissions vary from car to car depending on engine controls and the fuel chosen - making them not necessarily cleaner than a dedicated gas vehicle.
- **Dedicated:** A dedicated alternative fuel vehicle has only one fuel system. Unlike flex-fuel or bi-fuel vehicles, the vehicle only uses the alternative fuel.

For a list of vehicles, visit the DGS Procurement Division's [Commodity Contracts Index Listing](#) and refer to "vehicles".

### **Alternative Fuels**

Alternative fuels are used worldwide in a variety of vehicle applications. As defined by the Energy Policy Act of 1992, alternative fuels include ethanol, methanol, P-series fuels, natural gas, propane, hydrogen, electricity, and biodiesel. Using alternative fuels in vehicles can potentially reduce harmful pollutants and exhaust emissions. In addition, most of these fuels can be domestically produced and derived from renewable sources.

#### ***Ethanol***

Ethanol is an alcohol-based alternative fuel produced by fermenting and distilling starch crops that have been converted into simple sugars. Feedstocks for this fuel include corn, barley, and wheat. Ethanol can also be produced from "cellulosic biomass" such as trees and grasses and is called bioethanol. Ethanol is most commonly used to increase octane and improve the emissions quality of gasoline.

#### ***Methanol***

Methanol is an alcohol fuel made through a process using natural gas as a feedstock, and can be produced from coal or biomass. No vehicles capable of operating on methanol are currently being manufactured. However, methanol is being viewed as an excellent base fuel for fuel cell vehicles to convert hydrogen through a reformer.

### ***P-Series Fuels***

P-Series fuel is a unique blend of natural gas liquids (pentanes plus), ethanol, and the biomass-derived co-solvent methyltetrahydrofuran (MeTHF). "P-series fuels are to be used in flexible fuel vehicles (FFVs) originally designed to operate on E-85 (85 percent ethanol/15 percent gasoline), gasoline, or on any blend of those two fuels." [\[32\]](#) P-Series fuels are designed to be used alone or freely mixed with gasoline in any proportion inside the gas tank. This fuel is not currently being produced in large quantities and is not widely used.

### ***Natural Gas***

Natural gas is a domestically produced and clean burning fuel that produces fewer harmful emissions than reformulated gasoline or diesel when used in natural gas vehicles. Commercially available medium and heavy-duty natural gas engines have demonstrated more than 90 percent reductions of [carbon monoxide](#) and 50 percent of [nitrogen oxides](#).

### ***Propane***

Propane, or liquefied petroleum gas (LPG), is a popular alternative fuel choice for vehicles because there is already an infrastructure of pipelines, processing facilities, and storage for its efficient distribution.

### ***Hydrogen***

[Hydrogen \(H2\) technologies](#) (PDF, 187 KB) are expected to play an important role in developing sustainable transportation in the United States. Hydrogen has been used effectively in a number of internal combustion engine vehicles as pure hydrogen mixed with natural gas. It is also used in a growing number of fuel-cell vehicles. A number of important issues will need to be addressed in a move toward a hydrogen based transportation system, including a cost effective, renewable energy source for the production of the hydrogen fuel and building the infrastructure that makes the fuel readily available to consumers. [\[33\]](#)

### ***Electricity***

Electricity can be used as a transportation fuel to power battery electric and fuel cell vehicles. When used to power electric vehicles (EV), electricity is stored in an energy storage device such as a battery. EV batteries have a limited storage capacity. The electricity for recharging the batteries can come from the existing power grid or from distributed renewable sources such as solar or wind energy.

### ***Biodiesel***

Biodiesel is a domestically produced, renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. Biodiesel is safe, biodegradable, and reduces serious air pollutants such as particulates, carbon monoxide, hydrocarbons, and air toxics. Blends can generally be used in unmodified diesel engines, and it can also be used in its pure form. This may require certain engine modifications to avoid maintenance and performance problems and may not be suitable for wintertime use. This fuel is not currently being produced in large quantities and is not widely used. Lower-level biodiesel blends are not considered alternative fuels, but covered fleets can earn EPA credit.

### ***Advanced Technology Vehicles***

Hybrid-electric technology -- combining an internal combustion engine with a battery and electric motor -- is here to stay, and can be used in two opposite and opposing ways depending on the market. Hybrid technology is mostly promoted as offering higher gas mileage and cleaner burning cars. This is true, but not for all hybrids. The technology can also be used to increase vehicle performance, while sacrificing better fuel economy and clean emissions in the process. A list of currently certified hybrid-electric vehicles is available on-line. Tip: to ensure a vehicle is an Advanced Technology PZEV match the engine family number under the hood with the engine family number listed on-line.

Clean Gasoline -- there are many gasoline vehicles available today with extremely low emissions that are sometimes lower than hybrid or alternative fuel vehicles. These vehicles qualify as PZEVs, and have zero evaporative emissions while passing the ARB's most stringent tailpipe emission standards. A list of currently certified PZEVs is available on-line. Tip: to ensure a vehicle is a PZEV match the engine family number under the hood with the engine family number listed on-line.

## AVAILABILITY

Visit the following Web sites for tips on purchasing cleaner, fuel-efficient vehicles or learning what vehicles are available on state contracts:

- California Air Resources Board. Search for clean vehicles.
- California Department of General Services, Procurement Division (DGS-PD). For a list of vehicles, visit DGS-PD's Commodity Contracts Index Listing and refer to "vehicles".
- California Energy Commission. Consumer Energy Center. [Tips About Buying a New or Used Car Web page](#).
- United States Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE) Web pages.
- United States Environmental Protection Agency. [Green Vehicle Guide](#).

## PERFORMANCE

### General

AFVs and Advanced vehicles are equal in performance to conventional vehicles. For AFVs, some planning before trips may be needed in order to [locate a fueling station](#).

### State of California Carpool Lane [Access](#)

The cleanest alternative fuel, hybrid-electric and full-electric vehicles are eligible for single occupancy use of the carpool lane. Please note that not all hybrid-electric vehicles qualify.

## COST BENEFITS

### PZEV Vehicles, Warranties, and New Technologies

Gasoline vehicles with a PZEV rating are mass-produced in a variety of makes and models and are available to the public today. They have an immediate impact on air quality because they are popular models at affordable prices.

The extended warranty of AT PZEVs and PZEVs provides added security that the vehicle's emission related components will be maintained for a longer period of time. In most instances, choosing a cleaner vehicle model that comes with a better warranty adds less than \$100 (sometimes the price is the same) to the price of the vehicle.

Automakers are continually making advancements in technologies that improve their vehicles. Tremendous benefits have resulted alone by industry's ability to simplify, refine, and reduce the costs of their emission control systems.

### [Enhanced Efficiency Factor Costing Methodology](#)

In an attempt to reduce petroleum consumption and vehicle related emissions of [criteria pollutants](#), the state of California has developed a purchase methodology to factor in efficiency savings for vehicles that exceed the minimums already established by the state. In addition to the purchase price of a vehicle, this methodology takes into account the cost of fuel and emissions over the useful life of the vehicle.



## SPECIFICATIONS

### California

The Procurement Division of the Department of General Services develops vehicle specifications.

#### Other

- Specify rebuilt parts that meet [Federal Trade Commission guidelines](#).
- INFORM, Inc. provides specifications in its [Purchasing for Pollution Prevention: Vehicles Fact Sheet](#).
- United States Environmental Protection Agency (USEPA), [Database of Environmental Information for Products and Services](#). This database contains contract language, specifications, and policies created and used by federal, state, and local governments and others to buy environmentally preferable products and services. If you have a specification for an environmentally preferable product or service, consider asking the [USEPA](#) to include it in this database.

## VENDORS

### California

#### About [Statewide Vehicle Contracts](#)

The Department of General Services competitively bids and makes vehicle contracts available to California governmental entities helping to meet their vehicle fleet needs. These vehicle contracts leverage pricing based upon California government business volume enhanced by manufacturer and dealer incentive programs provided to government. They also provide a broad spectrum of vehicles at an eight to 12 percent cost savings over volume commercial fleet pricing.

#### [Alternative Fueled/Flex Fueled Vehicles, Vans, and Trucks](#)

Click on "Contract Information" for the current contract.

[Sedans, Station Wagons,](#) and [Hybrid Vehicles](#) Click on "Contract Information" for the current contract.

### Vehicle Rental

Some car rental companies now offer AFVs or hybrids. Contact the Department of General Services to determine if AFVs or hybrids are available through [state garages](#) and [commercial car rental contracts](#).

## SUCCESS STORIES

### United States Department of Energy -- Clean Cities Program

The goal of the United States Department of Energy [Clean Cities Program](#) is to advance the economic, environmental, and energy security of the United States by supporting local decisions to adopt practices contributing to the reduction of petroleum consumption in the transportation sector. Clean Cities strives to accomplish this through a network of nearly 90 community based coalitions composed of public and private entities which promote alternative fuels and vehicles, fuel blends, fuel economy, hybrid vehicles and idle reduction. Since its inception in 1993, Clean Cities has put close to one million AFVs on the road and displaced an estimated one billion gallons of gasoline. In 2004 alone, Clean Cities displaced 237 million gallons of gasoline. See [success stories](#).

### City of Vacaville, California

The City of Vacaville, California encourages the use of AFVs to improve air quality and has been a leader in promoting residential programs for compressed natural gas (CNG) vehicles and electric vehicles by offering incentive grants.

## RESOURCES AND WEBSITES

See also the resources listed in [Background and Environmental and Health Issues](#).

### [Automotive Parts Remanufacturers Association \(APRA\)](#)

Chantilly, VA

(703) 968-2772

The APRA is a non-profit trade association whose members rebuild/remanufacture automotive and truck related "hard" parts for passenger cars, trucks, off-road, marine, equipment and industrial uses.

### [California Air Resources Board \(ARB\)](#)

Sacramento, CA

(800) 242-4450

The mission of the ARB is to promote and protect public health, welfare and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the state. See the following on-line resources:

- [AB 2628 Eligible Vehicles - Single Occupant Carpool Lane Use Stickers](#)
- [Driveclean](#) - a zero and near-zero emission vehicle guide

### **California Department of General Services (DGS)**

#### [Office of Fleet Administration \(OFA\)](#)

Sacramento, CA

(916) 327-2086

The OFA provides transportation and commute-related services statewide, and is responsible for the establishment, implementation, and maintenance of policies and procedures governing state-owned mobile equipment. Transportation-related services provided include vehicle pools, repair facilities, vehicle inspection, employee parking, discount air fares, commercial car rentals, vehicle acquisition and disposition, and consultation regarding automotive management problems. See the [Alternative Fuel Vehicles Program](#) Web page.

### [California Department of Toxic Substances Control \(DTSC\)](#)

The Department's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. More than 1,000 scientists, engineers and specialized support staff work in [nine locations](#) statewide. See the following resources:

- [Fact sheets and other information on mercury waste classification and management](#)
- Vehicle Service and Repair Program

### [California Energy Commission](#)

Sacramento, CA

(916) 654-4287

The California Energy Commission is the state's primary energy policy and planning agency. See the [Alternative Fuel Vehicles \(AFVs\) and High-Efficiency Vehicles](#) Web page.

### [Center for a New American Dream](#)

Takoma Park, MD

(301) 891-3683 or 877-68-DREAM

The Center for a New American Dream helps Americans consume responsibly to protect the environment, enhance quality of life, and promote social justice. See the fact sheet titled [Harnessing the Power of Advanced Fleet Vehicles: A Hybrid Electric Vehicle Fact Sheet for Government Officials](#). (PDF, 450 KB)

#### **Clean Car Campaign**

Ann Arbor, MI  
(734) 663-2400  
Washington, DC  
(202) 387-3500

The Clean Car Campaign is a national campaign coordinated by state, regional and national environmental organizations promoting a clean revolution in the motor vehicle industry. The [Clean Car Standard](#) was developed by the campaign as a practical, short-term performance-based standard achievable by automakers. The standard promotes increased fuel efficiency, reduced tailpipe emissions and clean production practices.

#### **INFORM**

New York, NY  
(212) 361-2400

INFORM, Inc. is an independent research organization that examines the effects of business practices on the environment and on human health. See INFORM's [Purchasing for Pollution Prevention: Vehicles Fact Sheet](#).

#### **Minnesota Pollution Control Agency(MPCA)**

St. Paul, MN  
(651) 296-6300  
800 657 3864

The MPCA is a nonregulatory agency that works to improve our environment through partnerships, technology transfer, technical assistance, education, research, and matching grants. See the following resources:

- Pollution Prevention, P2 Best Practices, SIC 3711: Automotive Assembly Web page
- [Product Stewardship Initiative for Automobiles Web Page](#)

#### **Northeast Waste Management Officials' Association (NEWMOA)**

Boston, MA  
(617) 367-8558

NEWMOA's mission is to develop and sustain an effective partnership of states to explore, develop, promote, and implement environmentally sound solutions for the reduction and management of materials and waste, and for the remediation of contaminated sites, in order to achieve a clean and healthy environment. See the [automobile product category](#) in NEWMOA's Mercury in Products Database.

#### **United States Department of Energy**

##### **Office of Energy Efficiency and Renewable Energy (EERE)**

Washington, DC  
(877) EERE-INF (877-337-3463)

The EERE's mission is to strengthen America's energy security, environmental quality, and economic vitality in public-private partnerships that enhance energy efficiency and productivity; bring clean, reliable and affordable energy technologies to the marketplace; and make a difference in the everyday lives of Americans by enhancing their energy choices and their quality of life. See the following on-line resources:

- Clean Fleet Guide
- [A Consumer's Guide to Energy Efficiency and Renewable Energy -- Your Vehicle](#)
- Energy Policy Act (EPAct) of [1992](#).

### United States Environmental Protection Agency (USEPA)

Washington, DC

(202) 272-0167

The USEPA's mission is to protect human health and the environment. See the following resources:

- 2004 Comprehensive Procurement Guidelines Buy-Recycled Series [Vehicular Products Fact Sheet](#)
- [Green Vehicle Guide](#)
- [Greening EPA's Fleet Web page](#)

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[15] Clean Car Campaign. Lead-Free Wheels -- Safer Substitutes for Lead Wheel Weights Web page. Available at <http://www.cleancarcampaign.org/leadfreewheels.shtml>. Accessed on June 5, 2006.

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## Vehicles/Transportation - Heavy-Duty Vehicles

### Environmental and Health Issues and Recommendations



#### Air Quality:

Motor vehicles are California's leading source of air pollution. [1]

- Drive less or use cleaner vehicles to achieve our health-based air quality goals.



#### Global Warming / Climate Change:

In California, transportation is the source of more than half of the carbon dioxide (a greenhouse gas) emissions from fossil fuels. [2]

- Drive less and use fuel-efficient vehicles that emit lower levels of greenhouse gases.



#### Conserves Energy:

"Roughly half of all the energy used in California is used by the transportation sector. We use more than 16.5 billion gallons of gasoline a year. That's enough to drive a car, getting 30 mpg, three round trips to the sun." [3]

- Drive less and use fuel-efficient vehicles to save energy.



#### **Prevents Waste:**

Using rebuilt parts can reduce financial costs and conserve resources. [\[4\]](#)

- Purchase rebuilt parts that meet [Federal Trade Commission guidelines](#).



#### **Less Hazardous:**

Less toxic materials can be used to produce and maintain vehicles.

- During vehicle maintenance, request less hazardous replacement components, such as [lead](#)-free wheel weights.



#### **End-of-Life Management:**

Vehicular components and maintenance products should be managed in accordance with state laws and regulations.

See the [Introduction](#) for complete descriptions of these environmental and health issues.

- [Background and Environmental and Health Issues](#)
- [Laws and Guidelines](#)
- [Compressed Natural Gas](#)
- [Hybrid Electric Vehicles](#)
- [Liquefied Petroleum Gas](#)
- [Biodiesel](#)
- [Fischer-Tropsch Diesel](#)
- [After Treatment](#)
- [Specifications](#)
- [State Contract](#)
- [Success Stories](#)
- [Resources and Web Sites](#)

## **BACKGROUND AND ENVIRONMENTAL AND HEALTH ISSUES**

Smart transportation and vehicle maintenance decisions can reduce air pollution, combat climate change, save energy and natural resources, prevent waste, and keep hazardous waste out of the environment. Heavy-duty vehicles and light-duty vehicles share many environmental and health issues. See the [Background and Environmental Health Issues](#) heading in the Light-Duty Vehicles section for a detailed description of these issues.

Examples of heavy-duty vehicles include heavy-duty trucks, transit buses, street sweepers, and school buses. [\[5\]](#) According to the United States Environmental Protection Agency, reducing emissions from diesel engines "is one of the most important air quality challenges facing the country" [\[6\]](#) and the "majority of heavy-duty vehicles on our nation's highways today are powered by diesel fuel." [\[7\]](#) This presents enormous opportunities for cleaner-burning diesel substitutes (e.g., [biodiesel](#) and [Fischer-Tropsch diesel](#)) and for vehicles that run on other cleaner-burning fuels (e.g., natural gas).



## LAWS AND GUIDELINES

Some of the laws and guidelines that apply to light-duty vehicles apply to heavy-duty vehicles. See the [Laws, Regulations, and Policies](#) heading in the Light-Duty Vehicles section.

### Federal

**Final Rule: Control of Emissions of Air Pollution from New Motor Vehicles: In-Use Testing for Heavy-Duty Diesel Engines and Vehicles (Federal Register, Volume 70, Number 113, June 14, 2005, Rules and Regulations, pages 34593-34626)**

The United States Environmental Protection Agency established "a manufacturer-run, in-use emissions testing program for 2007 and later model year heavy-duty diesel vehicles. The ground-breaking in-use test program will require engine manufacturers to measure exhaust emissions from their diesel engines using portable emissions measurement systems. Also for the first time, all manufacturers will be regularly providing EPA with a significant quantity of emissions data generated from engines used in regular service, which EPA will evaluate to ensure the engines comply with specified emissions requirements. The rule is a result of an agreement between EPA and the Engine Manufacturers Association. This rule advances EPA's clean diesel activities by helping to ensure that the benefits of more stringent emission standards are realized under real-world driving conditions ... This final rule is effective August 15, 2005." [\[8\]](#)

## COMPRESSED NATURAL GAS

- [What is compressed natural gas?](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Vendors](#)

## WHAT IS COMPRESSED NATURAL GAS?

Compressed natural gas, or CNG, is a mixture of hydrocarbons, mainly methane. Found in gas wells or produced in conjunction with crude oil, natural gas is a clean-burning, domestically produced fuel that generates significantly fewer emissions than conventional gasoline or diesel when used to power vehicles. Although vehicles can use natural gas as either a liquid or a gas, most vehicles use the gaseous form. Compressed at pressures of 3,000 pounds to 3,600 pounds per square inch, the natural gas is stored on-board a vehicle in specially designed and constructed cylinders. Vehicles that run on CNG have engines and fuel systems that are optimized for gaseous fuel use.

CNG remains clear, odorless, and non-corrosive. Natural gas is one of the cleanest burning alternative fuels available and offers a number of advantages over gasoline. For heavy-duty and medium-duty applications, natural gas engines have demonstrated more than 90 percent reduction of [carbon monoxide](#) (CO) and particulate matter and more than 50 percent reduction of [nitrogen oxides](#) (NOx) relative to commercial diesel engines.

### Sources

- California Energy Commission. *Compressed Natural Gas as a Transportation Fuel*. Publication No. [CEC-600-2005-013-FS](#). August 2005 (PDF, 146 KB).
- United States Department of Energy. Energy Efficiency and Renewable Energy. Alternative Fuels and Advanced Vehicles Data Center. [Natural Gas Web page](#).

- United States Department of Energy. Energy Efficiency and Renewable Energy. Alternative Fuels and Advanced Vehicles Data Center. [Natural Gas Benefits Web page.](#)

## PERFORMANCE

CNG vehicles provide horsepower, acceleration, and a cruising speed similar to gasoline vehicles. However, natural gas trucks, like many other alternative fueled vehicles, typically have a shorter driving range than their diesel counterparts. This shorter range is a result of natural gas having a lower energy density and difficulty in packaging the high-pressure storage cylinders on the truck. Adding additional storage cylinders can increase the truck's driving range, but the added weight will reduce the amount of weight the vehicle can carry.

### Sources

- United States Department of Energy. Energy Efficiency and Renewable Energy. Alternative Fuels and Advanced Vehicles Data Center. Alternative Fuel Vehicles, Natural Gas Vehicles, [What Types of Vehicles Run on Natural Gas?](#) Web page.
- California Energy Commission. *ABCs of AFVs: A Guide to Alternative Fuel Vehicles*. Fifth Edition. 1999.

## AVAILABILITY

With the consumption of CNG increasing nationwide 145 percent during the past six years, the fueling infrastructure for natural gas vehicles continues to grow. California has more than 200 CNG fueling stations. In Southern California alone, there are more than 100 public fueling stations in major metropolitan areas from Los Angeles to the Mexican border. Another 50 stations are now under construction.

To locate commercial CNG stations, please visit the California Natural Gas Vehicle Coalition's Web site.

### Source

- California Energy Commission. *Compressed Natural Gas as a Transportation Fuel*. Publication No. [CEC-600-2005-013-FS](#). August 2005 (PDF, 146 KB).

## COST

Today's prices of CNG are generally less than gasoline or diesel fuel, on an equivalent energy basis, even when the CNG compressor station costs are considered. Although CNG is exempt from federal excise tax, it is subject to a federal energy tax of \$0.0485 per 100 standard cubic feet (scf), which is approximately \$0.056 per gasoline gallon equivalent. State taxes on CNG vary considerably.

In California, CNG is taxed at approximately \$0.07 per gasoline gallon equivalent, compared to \$0.18 per gallon for gasoline. Even though CNG fuel is comparatively less, the cost of the light-and heavy-duty vehicles is substantially more than their gasoline and diesel counterparts. Only in a minimal number of high-mileage fleet vehicle applications are the fuel cost savings adequate to amortize the CNG vehicle capital costs.

### Source

- California Energy Commission. *ABCs of AFVs: A Guide to Alternative Fuel Vehicles*. Fifth Edition. 1999.

## VENDORS

CNG trucks are currently available from several manufacturers. The United States Department of Energy maintains a [Vehicle search](#) page by model year of heavy-duty [alternative fuel vehicle](#) (AFV) and advanced technology vehicle (ATV) manufacturers. ("Advanced technology vehicles (ATVs) include hybrid electric vehicles, fuel cell vehicles, neighborhood electric vehicles, and electric bikes." [\[9\]](#))

## HYBRID ELECTRIC VEHICLES

- [What are hybrid electric vehicles?](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Vendors](#)

## WHAT ARE HYBRID ELECTRIC VEHICLES?

Hybrid electric vehicles (HEVs aka "hybrids") are vehicles that use two sources of motive energy, electrical and mechanical, to propel the vehicles. As their name implies, the vehicles combine the efficiency of electrical drive systems with the longer driving range gained from liquid or gaseous fuels. An HEV typically has an electrical storage device such as a battery, flywheel, or ultracapacitor in combination with a mechanical device such as an internal combustion engine, gas turbine, or fuel cell.

The two different HEV configurations are series and parallel hybrids. In a series configuration, the internal combustion engine, turbine, or fuel cell is used to generate electricity to charge the batteries, flywheel, or ultracapacitor. The drivetrain is powered solely from the motor connected to the electrical storage device. The benefits of a series configuration are reduced engine power cycling because the engine never idles; a transmission may not be needed; and more options are available for mounting the engine and vehicle components.

In a parallel configuration, the drive system can be powered simultaneously by the motor or by the mechanical device. In this configuration, both the electric motor and mechanical device can provide power to the drivetrain during acceleration, hill climbing, or passing. Once the vehicle reaches cruising speed, the vehicle just relies on the mechanical device to maintain speed. A parallel configuration could be set up to use an engine for highway driving and the power from the electric motor for accelerating. Some benefits of the parallel configuration are that the vehicle has more power since both the engine and the motor can supply power simultaneously; a generator isn't needed; and it can be more efficient since power is directly coupled to the road, which reduces energy conversion losses.

### Source

- California Energy Commission. *ABCs of AFVs: A Guide to Alternative Fuel Vehicles*. Fifth Edition. 1999.

## PERFORMANCE

HEVs have several advantages over traditional internal combustion engine (ICE) vehicles.

- The addition of liquid or gaseous fuels provides greater driving range than what could be obtained from just batteries alone. Coupled with higher fuel efficiency, a hybrid with an ICE can drive even farther than today's internal combustion engine vehicles before refueling.

- HEVs use regenerative braking to recapture braking energy. An HEV's electric motor can provide some braking power and act as a generator, producing electricity that can be stored in batteries or ultracapacitors. This power can be used to power the wheels and displace engine operation so less fuel is used and there are fewer emissions.
- HEVs have the potential to operate in "electric only" mode. In this mode, the vehicle can operate with no emissions, which is optimal in congested areas and in areas where emissions are not tolerated.
- The engine can be optimized to operate within a specific speed range where fuel economy is greatest and emissions are least.
- If an internal combustion engine is used, the engine can be smaller because it shares the workload with the electrical motor. This provides weight reductions that can result in greater fuel economy.
- The motor/battery can help power the vehicle and the engine can be turned off during nonuse times, such as at stops or coasting. This helps the engine to have a smoother operation, which decreases power spikes that can cause the engine to use more fuel and produce more pollution.
- An HEV engine can power electric components, which is more efficient than the mechanical counterparts normally used. An example of this would be using the electric motor instead of hydraulic power for steering.

#### Sources

- California Energy Commission. [ABCs of AFVs: A Guide to Alternative Fuel Vehicles](#). Fifth Edition. 1999.
- United States Department of Energy. Energy Efficiency and Renewable Energy. Clean Fleet Guide, Technologies. [Hybrid Electric Vehicles Web pages](#).

#### AVAILABILITY

An HEV can be used anywhere that fuel can be obtained for the mechanical device (such as an internal combustion engine). Unlike electric vehicles, the batteries or ultracapacitors on a hybrid vehicle are charged with the mechanical device and regenerative braking so there is no need to plug the vehicle into a charging station. Several models of HEV buses are available through the U.S. DOE's [vehicle search](#) page.

#### COST

Hybrid vehicles cost more than traditional gasoline or diesel vehicles. Theoretically the additional cost of the vehicle may be offset with reduced fuel costs. However, additional maintenance costs such as replacement of the batteries must be taken into consideration. Combined with the limited availability, heavy-duty hybrid trucks are currently not the most economical choice.

#### VENDORS

Several manufacturers are developing hybrid trucks, but there are very few that are currently available. The United States Department of Energy maintains a [vehicle search](#) page of heavy-duty [alternative fuel vehicle](#) (AFV) and advanced technology vehicle (ATV) manufacturers.

#### LIQUEFIED PETROLEUM GAS

- [What is liquefied petroleum gas?](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)

- [Vendors](#)

## WHAT IS LIQUEFIED PETROLEUM GAS?

Motor fuel propane, otherwise known as liquefied petroleum gas (LPG), is produced as part of natural gas processing and crude oil refining. In natural gas processing, the heavier hydrocarbons that naturally accompany natural gas, such as LPG, butane, ethane, and pentane, are removed prior to the natural gas entering the pipeline distribution system. In crude oil refining, LPG is the first product that results at the start of the refining process, and is therefore always produced when crude oil is refined.

Propane is a gas that can be turned into a liquid at a moderate pressure, 160 pounds per square inch (psi), and is stored in pressure tanks at about 200 psi at 100 degrees Fahrenheit. When propane is drawn from a tank, it changes to a gas before it is burned in the engine. Propane has been used as a transportation fuel since 1912, and is the third most commonly used fuel in the United States, behind gasoline and diesel. More than four million vehicles fueled by propane are in use around the world in light, medium, and heavy-duty applications. Propane holds approximately 86 percent of the energy of gasoline and so requires more storage volume to drive a range equivalent to gasoline, but it is price competitive on a cents-per-mile-driven basis.

Propane is a low-emission, economic, and easily used fuel that can play an important role as an alternative fuel for our state and the nation.

### Source

- California Energy Commission. *Propane as a Transportation Fuel*. Publication No. [CEC-600-2005-015-FS](#). August 2005 (PDF, 111 KB).

## PERFORMANCE

LPG vehicles provide power, acceleration, and a cruising speed similar to gasoline vehicles. However, propane trucks, like many other alternative fueled vehicles, typically have a shorter driving range than their diesel counterparts. This shorter range is a result of propane having a lower energy density and difficulty in packaging the high-pressure storage cylinders on the truck. Adding additional storage tanks can increase the truck driving range, but the added weight will reduce the amount of weight the vehicle can carry.

### Source

- United States Department of Energy. Energy Efficiency and Renewable Energy. Alternative Fuels and Advanced Vehicles Data Center. [Propane Vehicles Web pages](#).

## AVAILABILITY

Approximately 1,200 facilities in California dispense propane. Nearly all of these facilities are used primarily to fuel residential and commercial applications such as heaters, recreational vehicles, and barbecues. About half of all these facilities are capable of providing propane as a motor fuel, though only about three percent of all the fuel dispensed is used for transportation applications. Since 2000, the California state fleet has purchased, and is now operating in daily use, nearly 1,600 bi-fuel propane Ford F-150 pickup trucks. The potential use of propane in those vehicles constitutes the largest petroleum displacement for the state fleet; it could displace approximately 4.4 percent of the total fleet fuel use, if these vehicles were exclusively operated on propane.

Accordingly, the California Energy Commission and the United States Department of Energy have provided funding to establish 25 motor fuel propane stations across the state. These stations are situated for convenient use by the California Department of Transportation (Caltrans) and the Department of Water Resources vehicular fleets, and for use by the public. The stations are unique from other propane filling stations. They have dispensers on the fueling island at a gasoline station, use fleet fueling cards or credit cards, and offer fuel that is priced competitively with gasoline or diesel on a fuel equivalency basis.

To locate commercial LPG stations, please search the United States Department of Energy's [Alternative Fueling Station Locator](#).

#### Source

- California Energy Commission. *Propane as a Transportation Fuel*. Publication No. [CEC-600-2005-015-FS](#). August 2005. (PDF, 111 KB)

#### COST

The initial cost of an LPG vehicle is significantly more than a gasoline vehicle. However, low maintenance costs, fuel savings, and lower emissions are some of the benefits of LPG trucks. The cost of converting a conventional heavy-duty gasoline fueled truck to LPG can be partially offset by incentives offered under the federal [Energy Policy Act of 1992](#) (EPAAct). Many states and local governments also offer incentives for use of LPG vehicles.

#### Source

- California Energy Commission. *ABCs of AFVs: A Guide to Alternative Fuel Vehicles*. Fifth Edition. 1999.

#### VENDORS

The majority of LPG vehicles are the result of upfitting gasoline vehicles to use propane, either exclusively or in a bi-fuel configuration. Converting diesel engines to LPG operation is also possible, but not economically practical.

The United States Department of Energy maintains a comprehensive list of manufacturers of LPG-fueled heavy-duty vehicles.

#### BIODIESEL

- [What is biodiesel?](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Vendors](#)

#### WHAT IS BIODIESEL?

Biodiesel is the name of a clean burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics.



**How is biodiesel made?**

Biodiesel is made through a chemical process called transesterification whereby the glycerin is separated from the fat or vegetable oil. The process leaves behind two products -- methyl esters (the chemical name for biodiesel) and glycerin (a valuable byproduct usually sold to be used in soaps and other products).

- Look for biodiesel that is made from used material, such as used cooking oil.

**Source**

- National Biodiesel Board. [Biodiesel Basics Web page](#).

**PERFORMANCE**

Successful alternative fuels help fulfill environmental and energy security needs without sacrificing operating performance. Operationally, biodiesel blends perform very similar to low sulfur diesel in terms of power, torque, and fuel without major modification of engines or infrastructure.

**Biodiesel offers similar power to diesel fuel.**

One of the major advantages of biodiesel is the fact that it can be used in existing engines and fuel injection equipment with little impact to operating performance. Biodiesel has a higher cetane number than most United States diesel fuel. In more than 50 million on-road miles and countless marine and off-road applications, biodiesel shows similar fuel consumption, horsepower, torque, and haulage rates as conventional diesel fuel.

**Biodiesel provides significant lubricity improvement over petroleum diesel fuel.**

Lubricity results of biodiesel and petroleum diesel using industry test methods indicate that there is a marked improvement in lubricity when biodiesel is added to conventional diesel fuel. Even biodiesel levels as low as one percent can provide up to a 65 percent increase in lubricity in distillate fuels.

**Compatibility of biodiesel with engine components**

The switch to low sulfur diesel fuel has caused most original equipment manufacturers (OEM) to switch to components suitable for use with biodiesel, but users should contact their OEM for specific information. In general, pure biodiesel will soften and degrade certain types of elastomers and natural rubber compounds over time. Using high percent blends can impact fuel system components (primarily fuel hoses and fuel pump seals) that contain elastomer compounds incompatible with biodiesel. Manufacturers recommend that natural or butyl rubbers not be allowed to come in contact with pure biodiesel. Blends of B20 (a B20 blend is 20 percent by volume biodiesel and 80 percent by volume petrodiesel [\[10\]](#)) or lower have not exhibited elastomer degradation and need no changes. If a fuel system does contain these materials and users wish to fuel with blends over B20, replacement with compatible elastomers is recommended.

**Biodiesel in cold weather**

Cold weather can cloud and even gel any diesel fuel, including biodiesel. Users of a 20 percent biodiesel blend with #2 diesel will usually experience an increase of the cold flow properties (cold filter plugging point, cloud point, pour point) approximately 2 degrees to 10 degrees Fahrenheit. Precautions employed for petroleum diesel are needed for fueling with 20 percent blends. Neat (100 percent) biodiesel will gel faster than petrodiesel in cold weather operations. Solutions for winter operability with neat biodiesel are much the same as that for low-sulfur #2 diesel (i.e., blending with #1 diesel, utilization of fuel heaters, and storage of the vehicle in or near a building). These same solutions work well with biodiesel blends, as does the use of cold flow improvement additives.

**Source**

- National Biodiesel Board. Biodiesel Performance.

## AVAILABILITY

Biodiesel is available across the country, specifically in the Midwest in Illinois, Ohio, Iowa, Missouri, etc. Although the highest availability is in the Midwest, biodiesel is available in California. Most of the biodiesel distributors and retailers are located along the coast from San Diego to Shasta.

### **Purchase biodiesel from producers directly.**

This is the most likely method of purchase for fuel distributors and bulk B100 (100 percent biodiesel [\[11\]](#)) purchasers of biodiesel. Some individual consumers may also buy biodiesel directly from producers by the drum. Although biodiesel producers are located throughout the country, proximity is not necessarily an issue. The National Biodiesel Board (NBB) recommends interested buyers get bids from several member companies.

A list of NBB member producers and marketers is available on-line.

### **Buy from a petroleum distributor.**

This is the most common way for farmers and centrally-fueled fleets to get biodiesel. There are more than 1,400 petroleum distributors carrying biodiesel and biodiesel blends nationwide, including some large companies. Most biodiesel distributors will deliver the biodiesel in pure form or already blended according to the customer's preference. Ask your distributor to carry biodiesel, and if your request is not granted, then change to a distributor who will. Once they realize demand is out there and that biodiesel is a valuable addition to their product lines, most distributors will make it available.

Visit the National Biodiesel Board's Web site for a national map and list of biodiesel distributors.

### **Purchase biodiesel from the pump.**

There are hundreds of retail stations that now make biodiesel blends available to the public both at gas stations and fuel docks. More are coming on line all the time, increasing availability across the nation.

Visit the National Biodiesel Board's Web site for a national map and list of biodiesel retailers.

## COST

The prices of biodiesel blends B2-B5 (2 - 5 percent biodiesel in diesel fuel) and B20 (20 percent biodiesel/80 percent diesel) are comparable to diesel fuel, while B100/B99 blends (100 or 99 percent biodiesel) cost more than diesel. The United States Department of Energy (DOE) is working with the biodiesel industry to reduce the cost of biodiesel. Check recent reports by the DOE for current information.

### **Sources**

- United States Department of Energy (DOE), [Clean Cities Alternative Fuel Price Report, June 2006](#) (PDF, 510 KB). Pages 9-11. Current reports are available from the DOE.
- North Dakota State University Extension Service. [Biodiesel Fuel](#). AE-1240, February 2003.

For more information regarding production costs, capacity, and government incentives, see the article titled [Biodiesel Performance, Costs, and Use](#) that is available from the federal [Energy Information Administration](#).

## VENDORS

There are many different vendors and distributors all throughout California that stock a variety of different mixtures of biodiesel. Visit the NBB's Web site for lists of:

- NBB member producers and marketers (PDF, 58 KB)
- California distributors
- California retailers

There are two types of biodiesel suppliers -- distributors and retailers. While retailers generally do not deliver, the distributors will deliver large amounts. Distributors will deliver or fill large quantities of fuel in pure form (B100) or other common mixtures, while retailers have drive up pump stations that also have several different common mixtures.

## FISCHER-TROPSCH DIESEL

- [What is the Fischer-Tropsch process?](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Vendors](#)

## WHAT IS THE FISCHER-TROPSCH PROCESS?

The Fischer-Tropsch process is a catalyzed chemical reaction in which carbon monoxide and hydrogen are converted into liquid hydrocarbons of various forms. Typical catalysts used are based on iron and cobalt. The principal purpose of this process is to produce a synthetic petroleum substitute.

### How is Fischer-Tropsch diesel made?

Fischer-Tropsch diesel is made by taking products such as coal, natural gas, and low-value refinery products and applying the Fischer-Tropsch process in order to make liquid diesel fuels.

### Sources

- Wikipedia. [Fischer-Tropsch process](#).
- United States Environmental Protection Agency. Office of Transportation and Air Quality. Transportation and Regional Programs Division. *Clean Alternative Fuels: Fischer-Tropsch, fact sheet number EPA420-F-00-036*. March 2002. (www.epa.gov/otaq/consumer/fuels/altfuels/420f00036.pdf, offline)

## PERFORMANCE

Fischer-Tropsch diesel is not widely used or tested; however, according to a United States Environmental Protection Agency fact sheet, Fischer-Tropsch fuel has a higher cetane number than traditional diesel, is low-sulfur, and "is colorless, odorless, and low in toxicity. In addition, it is virtually interchangeable with conventional diesel fuels and can be blended with diesel at any ratio with little to no modification. Fischer-Tropsch fuels offer important emissions benefits compared with diesel, reducing nitrogen oxide, carbon monoxide, and particulate matter." [\[12\]](#)

## AVAILABILITY

Fischer-Tropsch diesel is not widely used in North America. There are three major factories worldwide: two in South Africa and one in Malaysia. These are the three major factories that produce and export large amounts of Fischer-Tropsch diesel worldwide. Plans for supplying California with competitively priced Fischer-Tropsch diesel have been presented by the California Energy Commission and the California Air Resources Board.

## **COST**

The prices of this form of diesel are not yet specifically determined; although, the main source of Fischer-Tropsch diesel, coal, has been very stable and slightly declining in price over the past 15 years to 20 years.

## **Source**

- Fischer-Tropsch Diesel - Meeting the California Supply Challenge. Alternative Diesel Fuels Symposium presented by the California Energy Commission and the California Air Resources Board. August 19, 2003.

## **VENDORS**

The following agencies may be able to assist with locating Fischer-Tropsch diesel vendors:

- California Energy Commission, Emerging Fuels and Technology Office
- United States Department of Energy, Office of [Energy Efficiency and Renewable Energy Information Center](#)
- United States Environmental Protection Agency, Office of Transportation and Air Quality, Transportation and Regional Programs Division. See the [Fuels and Fuel Additives - Alternative Fuels Web page](#).

## **AFTER TREATMENT**

- [What are after treatment units?](#)
- [Performance](#)
- [Availability](#)
- [Cost](#)
- [Vendors](#)

## **WHAT ARE AFTER TREATMENT UNITS?**

These units treat the exhaust gases coming from diesel and gasoline engines. Through a series of gas neutralization and collection of harmful toxins, after treatment units eliminate many, if not all, of the harmful elements coming from the exhaust.

These systems use the chemical reactions resulting from 12 different gas species, taking into consideration all kinetic aspects. Other processes in the after treatment system include a three-way catalytic converter, hydrocarbon (HC) trap, NOx trap, oxygen storage, diesel oxidation catalyst, and diesel particulate filter.

After treatment technologies are also referred to as "retrofitting." [\[13\]](#)

## **PERFORMANCE**

There are several different types of after treatment systems that accomplish the task of treating exhaust gases. Each system has its own costs and benefits and others are still in development.

- The following retrofit diesel emission reduction strategies are described on the United States Environmental Protection Agency's (USEPA) National Clean Diesel Campaign, Clean Ports USA, Technologies Web page: diesel particulate filters, diesel oxidation catalysts, closed crankcase ventilation, selective catalytic reduction, lean NOx catalyst, exhaust gas recirculation, and idle reduction.
- **Plasma Reactors**  
Plasma reactors provide an after treatment system that greatly reduces NOx emissions from diesel engines. This system uses a high voltage plasma reactor able to withstand the high temperatures of an exhaust unit of an automobile to eliminate the NOx particles produced by diesel engines.

More information is available on-line:

- Fraunhofer Institute for Laser Technology. Plasma Reactors for Exhaust After-Treatment Web page.
- Pacific Northwest National Laboratory. William R. Wiley Environmental Molecular Sciences Laboratory. *Interfacial and Processing Sciences Annual Report 1999. Plasma Assisted Catalysis for Heavy Duty Diesel Engines.*
- United States Department of Energy. [Novel plasma catalysts significantly reduce NOx from diesel engines](#) (PDF, 122 KB).

## AVAILABILITY

After treatment systems are widely available from a variety of different [vendors](#).

## COST

Costs vary depending on function and specifications. Newer and more advanced models are more expensive but promise greater fuel efficiency with greater flow and less backpressure or greater neutralization results.

## VENDORS

The USEPA maintains a list of retrofit manufacturers that make products whose performance has been verified (verified retrofit technologies) through the USEPA [Voluntary Diesel Retrofit Program](#).

## SPECIFICATIONS

### California

The [Procurement Engineering Team](#) of the Procurement Division of the Department of General Services develops and reviews specifications for statewide commodity standards and information technology. If you have questions regarding developing specifications, or would like a copy of one of their specifications, please [contact the team](#).

### United States Department of Energy

Specifications are available for heavy-duty advanced technology vehicle models and heavy-duty hybrid electric vehicles through the U.S. DOE's [vehicle search](#) page.

## STATE CONTRACT

[Alternative Fueled/Flex Fueled Vehicles and Trucks](#), Contract #1-06-23-22. (To view the contract, click on "Contract Information.")

## SUCCESS STORIES

### United States Department of Energy Clean Cities Program

Visit the United States Department of Energy's Clean Cities program's [accomplishments](#) section that offers an inside look at how fleets use alternative fuel vehicles (AFV), deal with infrastructure issues, obtain funding, and more.

## RESOURCES AND WEBSITES

*See also the resources listed under [Background and Environmental and Health Issues](#) in the [Light-Duty Vehicles](#) section, since the topics presented apply to all types of vehicles.*

### [Automotive Parts Remanufacturers Association](#) (APRA)

Chantilly, VA  
(703) 968-2772

The APRA is a non-profit trade association whose members rebuild/remanufacture automotive and truck related "hard" parts for passenger cars, trucks, off-road, marine, equipment and industrial uses.

### [California Air Resources Board](#) (ARB)

Sacramento, CA  
(800) 242-4450

The mission of the ARB is to promote and protect public health, welfare and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the state. See the following on-line resources:

- [AB 2628 Eligible Vehicles - Single Occupant Carpool Lane Use Stickers](#)
- [Driveclean](#) - a zero and near-zero emission vehicle guide
- [Report on the Lower-Emission School Bus Program](#) (PDF, 225 KB)

### California Department of General Services (DGS)

#### [Office of Fleet Administration](#) (OFA)

Sacramento, CA  
(916) 327-2086

The OFA provides transportation and commute-related services statewide, and is responsible for the establishment, implementation, and maintenance of policies and procedures governing state-owned mobile equipment. Transportation-related services provided include vehicle pools, repair facilities, vehicle inspection, employee parking, discount air fares, commercial car rentals, vehicle acquisition and disposition, and consultation regarding automotive management problems. See the Alternative Fuel Vehicles Program Web page.

### [California Department of Toxic Substances Control](#) (DTSC)

The Department's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention. More than 1,000 scientists, engineers and specialized support staff work in [nine locations](#) statewide. See the following resources:

- [Fact sheets and other information on mercury waste classification and management](#)
- Vehicle Service and Repair Program



### **California Energy Commission**

Sacramento, CA  
(916) 654-4287

The California Energy Commission is the state's primary energy policy and planning agency. See the Alternative Fuel Vehicles (AFVs) and High-Efficiency Vehicles Web page.

### **Center for a New American Dream**

Takoma Park, MD  
(301) 891-3683 or 877-68-DREAM

The Center for a New American Dream helps Americans consume responsibly to protect the environment, enhance quality of life, and promote social justice. See the fact sheet titled *Harnessing the Power of Advanced Fleet Vehicles: A Hybrid Electric Vehicle Fact Sheet for Government Officials* (PDF, 450 KB).

### **Clean Car Campaign**

Ann Arbor, MI  
(734) 663-2400  
Washington, DC  
(202) 387-3500

The Clean Car Campaign is a national campaign coordinated by state, regional and national environmental organizations promoting a clean revolution in the motor vehicle industry. The [Clean Car Standard](#) was developed by the campaign as a practical, short-term performance-based standard achievable by automakers. The standard promotes increased fuel efficiency, reduced tailpipe emissions and clean production practices.

### **INFORM**

New York, NY  
(212) 361-2400

INFORM, Inc. is an independent research organization that examines the effects of business practices on the environment and on human health. See INFORM's [Purchasing for Pollution Prevention: Vehicles Fact Sheet](#).

### **Minnesota Pollution Prevention Agency (MPCA)**

St. Paul, MN  
(651) 296-6300

The MPCA is a nonregulatory agency that works to improve our environment through partnerships, technology transfer, technical assistance, education, research, and matching grants. See the following resources:

- Pollution Prevention, P2 Best Practices, [Automotive Assembly Web page](#)
- [Product Stewardship Initiative for Automobiles](#) Web Page

### **Northeast Waste Management Officials' Association (NEWMOA)**

Boston, MA  
(617) 367-8558

NEWMOA's mission is to develop and sustain an effective partnership of states to explore, develop, promote, and implement environmentally sound solutions for the reduction and management of materials and waste, and for the remediation of contaminated sites, in order to achieve a clean and healthy environment. See the [automobile product category](#) in NEWMOA's Mercury in Products Database.

### **United States Department of Energy Office of Energy Efficiency and Renewable Energy (EERE)**

Washington, DC

(877) EERE-INF (877-337-3463)

The EERE's mission is to strengthen America's energy security, environmental quality, and economic vitality in public-private partnerships that enhance energy efficiency and productivity; bring clean, reliable and affordable energy technologies to the marketplace; and make a difference in the everyday lives of Americans by enhancing their energy choices and their quality of life. See the following on-line resources:

- [Fleet Guide](#)
- [A Consumer's Guide to Energy Efficiency and Renewable Energy -- Your Vehicle](#)
- Energy Policy Act (EPAct) of 1992.
- [State Energy Program, Projects by Topic - Trucks and Heavy Vehicles](#)

#### **United States Environmental Protection Agency (USEPA)**

Washington, DC

(202) 272-0167

The USEPA's mission is to protect human health and the environment. See the following resources:

- 2004 Comprehensive Procurement Guidelines Buy-Recycled Series Vehicular Products Fact Sheet
- [Green Vehicle Guide](#)
- [Greening EPA's Fleet Web page](#)
- [National Clean Diesel Campaign](#)

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<http://www.arb.ca.gov/app/emsmv/emssumcat.php>.

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[7] United States Environmental Protection Agency. Office of Transportation and Air Quality. Transportation and Regional Programs Division. Clean Alternative Fuels: Fischer-Tropsch, fact sheet number EPA420-F-00-036, March 2002, <http://www.epa.gov/otaq/consumer/fuels/altfuels/420f00036.pdf> (offline). Accessed on June 2, 2006

[8] Federal Register, Volume 70, Number 113, June 14, 2005, Rules and Regulations, pages 34593-34626. Available on-line at <http://www.gpoaccess.gov/cfr/index.html>. Accessed on August 2, 2006.

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- [11] National Biodiesel Board. Specification for Biodiesel (B100). Available at [http://www.biodiesel.org/pdf\\_files/fuelfactsheets/BDSpec.PDF](http://www.biodiesel.org/pdf_files/fuelfactsheets/BDSpec.PDF). Accessed on June 1, 2006.
- [12] United States Environmental Protection Agency. Office of Transportation and Air Quality. Transportation and Regional Programs Division. Clean Alternative Fuels: Fischer-Tropsch, fact sheet number EPA420-F-00-036, March 2002, <http://www.epa.gov/otaq/consumer/fuels/altfuels/420f00036.pdf> (offline). Accessed on June 2, 2006.
- [13] United States Environmental Protection Agency. National Clean Diesel Campaign, Clean Ports USA, Technologies Web page. Available at <http://www.epa.gov/cleandiesel/ports/technologies.htm>. Accessed on July 2, 2006.